COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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NEWSPAPER

An 'Olympian' Task

A timing station receives data on competitors' performances at the XIIth Winter Olympics which began last week in Innsbruck, Austria. Honeywell Bull's information service relays the current placing of competitors for every event through terminal links to scoreboard controllers, the press and television. See story on Page 7.

Called Nonprofessionals

Programmers Win Overtime

By Catherine Arnst
Of the CW Staff

NASHVILLE, Tenn. – Computer programmers cannot be considered executive, administrative or professional personnel and therefore must be paid overtime, a U.S. district court judge ruled here recently.

The decision was handed down Jan. 15 in what is thought to be the first court case on this issue, Pezzillo et al vs. General Telephone & Electronics Information Systems, Inc. (GTE).

Judge L. Clure Morton based his ruling on the fact that the work done by the nine programmers who brought the suit did not involve "significant independent discretion," F. Clay Bailey, attorney for the plaintiffs, said.

"The employees merely took specifications prepared by analysts and programmed them," he added.

Proof 'Overwhelming'

The judge compared the activities of the programmers to those of draftsmen working for an architect, who do not get paid overtime, and ruled that "the proof was overwhelming that the programmers were not exercising independent discretion," Bailey said.

The suit was brought against GTE in May 1974 by the programmers, who claimed they had not been paid overtime for work done during 1973 in Miami, where they were installing and implementing new systems.

GTE alleged these men were administrative personnel.

According to the Fair Labor Standards Act of 1938, Section 213, "any employee employed in a bona-fide executive, administrative or professional capacity" is exempt from the law demanding overtime.

Under the act, administrative personnel are those who perform "office or nonmanual work directly related to management policies . . . who customarily and regularly" exercise discretion and independent judgment, who perform "under only general supervision" and who do "not devote more than 20% of their hours in activities which are not directly or closely related to management responsibilities."

Hearings were held by the Department of Labor's Wage and Hour Division on whether programmers should be considered professionals and thus exempt in 1971 [CW, Feb. 10, 1971].

In December of that year, the department decided programmers were not exempt and should not be considered professionals [CW, Feb. 16, 1972].

The official title of the nine programmers involved in the suit was consulting programming analysts, "but what they did was programming and those activities are considered nonexempt," Bailey said.

Treated as Professionals

The employees had been treated as professionals by GTE and were not paid overtime unless a contract called for over-

(Continued on Page 2)

In Ongoing Study

FCC Recommends Bell Spin-Off

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – A Federal Communications Commission (FCC) trial staff report has recommended changes to the Communications Act of 1934 that would force AT&T to spin off its Western Electric manufacturing affiliate.

The staff report was part of an ongoing FCC examination of AT&T pricing and economics begun in 1970. The report was critical of AT&T practices in a number of areas, and it made specific recommendations on how AT&T operations could be improved.

The report was sent to the administrative law judge who will make a report later to the FCC.

The AT&T rate base, on which the phone company bases its tariff charges, is excessive and should be reduced, the report said. AT&T has overcharged interstate customers during the years 1971 to 1975, and it should refund $1.655 billion to these users, the report said.

For the year 1975, the rate base should be reduced by more than $3 million because of incorrect accounting, the report said.

Accounting System

One reason AT&T has been unable to supply requested accounting information to the trial staff has been that the Bell System Uniform System of Accounts "is a sorry anachronism," and the report suggested that within nine months the telephone company set up a more accurate accounting system.

In areas where Bell has been forced to compete for services and equipment, "AT&T has orchestrated and continues to orchestrate a series of policies that have as their end the destruction and elimination of competition in telephone equipment. Such action spells market foreclosure," the report said.

Divestiture of Western Electric would be "a method of achieving competition in the telecommunications equipment industry. Competition is in the public interest because it redounds to the benefit of all telephone subscribers."

A spin-off of Western Electric would also "lessen the potential for future violations of the nation's antitrust laws by Western Electric, AT&T and the Bell System operating companies," the report said.

The Justice Department in 1974 filed an antitrust suit in Washington, D.C. which asked for the divestiture of Western Electric, but the FCC trial staff report is not directly related to that suit. However, it is expected the FCC will participate in certain questions raised at the antitrust trial.

The staff found AT&T's principles and criteria for setting rates on interstate long-distance calls were "broad and vague and thus give AT&T great flexibility."

These rates "are not based on the actual costs of the service," the report said. It recommended AT&T provide free direct-dial calls between 2 a.m. and 6 a.m.

(Continued on Page 2)

Users Ask HIS Software Fee End

By Molly Upton
Of the CW Staff

PHOENIX – The Coordinating Council of the Honeywell Users Group (HUG) has adopted a resolution asking Honeywell Information Systems (HIS) to rescind its policy of charging for software on used machines.

The group will evaluate HIS' response at its next meeting in July, Thomas White, a past president of HUG, said.

If Honeywell persists in charging for software on used machines, the group should increase its dues to fund a national program, including legal means and publicity, to convince Honeywell to change its stance, he said.

This program would include action to heighten the awareness of Congress and the Federal regulatory agencies, customers, the media and financial community about Honeywell's present actions.

Honeywell "has been contemptuous of users of repurchased computers," White said.

"Its policy toward licensing software to buyers of such computers is tantamount to destroying the market for used equipment and drastically affecting the business of all users of these computers," he said.

Since October, HIS has charged buyers of used computers either a one-time charge of $35,000 or a monthly $3,500 fee for OS2000, he said.

This policy reduces the value of HIS machines by a minimum of $35,000, probably $70,000, he said, adding he believes this policy is directly contrary to those of all other mainframe manufacturers.

Other topics discussed at the meeting included reorganization of the users group to include more of a national representation for users of small- and medium-size machines, he said.

Although the group is national in that users from all over the country attend meetings, the larger users have more of a voice since many of the smaller ones cannot afford to travel, he said.

'Turnkey' Tests Hardware Performance

By Patrick Ward
Of the CW Staff

McLEAN, Va. – Tesdata Systems Corp. has brought out a "turnkey" performance measurement system aimed at medium-sized mainframe users who may have felt hardware monitoring was beyond their shop's budget and capabilities.

Like other performance measurement systems, the Tesdata MS32 is designed to help users better understand their hardware needs, pinpoint bottlenecks that may be limiting their service to users and provide documentation on hardware questions for management, a Tesdata spokesman said.

However, the MS32 is designed to let a mid-sized user's DP shop do the measurement and analysis job itself, without an expensive performance measurement staff, Tesdata said.

The MS32 comes with up to five turnkey application packages (T-Pacs) on plug-in diskettes and a data base capability for on-line reporting.

Tesdata also does all CPU sensor hookups to the user's CPU when the MS32 is installed and provides prewired control panels matched to the user's measurement goals.

The MS32 comes with an operations handbook designed to lead the user step by step through the measurement process.

A management and analysis handbook tells the user "how to obtain a particular report, what it will look like, how often to run it and what to look for," a Tesdata spokesman said.

Tesdata said it plans to extend the turnkey performance measurement concept to its larger measurement systems by June.

The MS32's T-Pacs can be used with the IBM 360/370 series, Univac's 1100 and 9000 series and the Honeywell 6000 series, Tesdata said.

T-Pac A, on the MS32 for example, provides the user with a basic system profile (channel and CPU information) and a basic I/O profile (channel/CPU

(Continued on Page 6)

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Eckert, David Keynoters

Compcon to Probe DP's Next Five Years

SAN FRANCISCO – "Evolution or Revolution" in the next five years is the theme of the 12th annual IEEE Computer Society International Conference (Compcon) to be held at the Jack Tar Hotel here Feb. 24-26.

Edward E. David Jr., former science advisor to the President of the U.S., will deliver the keynote address on the conference theme, followed by J. Presper Eckert of Univac who will talk about the beginnings of the computer era. Eckert was coinventor with Dr. J.W. Mauchley of the Eniac.

A special evening panel will also focus on the theme and will be led by Willis Ware of the Rand Corp. and include chairmen of afternoon sessions.

These will be Michael Flynn of Stanford University, hardware; Robert McClure of Palyn Associates, software; J. Michael Galey of IBM, firmware; Andy Knowles of Digital Equipment Corp., applications; and Jack S. Gilby, consultant, technology.

On Wednesday, sessions will examine what's going on in the rest of the world, the evolution of microprocessor hardware, distributed computer systems, microprocessor software, mass storage and data communication techniques.

Other Sessions

Other sessions will look at the direction of data base systems, the solid-state memory race, computer networks, language-directed machines and super computers.

Electronic funds transfer, hardware design techniques, financing, computer and crime, software engineering and computer science education programs are other topics that will be discussed at the conference.

On the preceding Monday, a tutorial will be held on "unique aspects of microcomputer applications" offered by Fred F. Coury.

The conference and the tutorial each cost nonmembers $65 and members $50. The fee for both is $130 and $100, respectively.

Advance registration may be sent to Jon E. Petersen, Compcon 76, IBM Corp. R62/123, 5600 Cottle Road, San Jose, Calif. 95193.

In Ongoing Study

FCC Recommends Bell Divestiture

(Continued from Page 1)

"when the telephone system is almost completely idle." Also recommended was a "flat fee for operator-handled calls regardless of distance."

In reacting to the introduction of competitive equipment by noncarrier suppliers, Bell had characteristically decided to make its own product instead of acquiring a product from an outside supplier.

'Born in Haste'

As a result, the Bell operating companies often have had to buy untested Western Electric-product equipment "born in haste." But the competitive effect of noncarrier products has been to make the Bell System more responsive to the needs of customers than it otherwise might have been, the report said.

An AT&T statement responding to the trial staff report called the recommendations "the most radical position presented in the course of these [FCC] proceedings.

"Because the recommendations are so extreme, they will be of little help to the administrative law judge who must initially decide the issues or to the FCC itself which must ultimately decide."

The statement issued by AT&T Vice-President James R. Billingsley questioned the validity of free late-night calls, asking "who would pay for these free calls?" To render this service free would mean that the average working man or woman who could not schedule calls during those hours would have to support those who could, he said.

Responding to the suggestion that Western Electric be divested, Billingsley said ownership of the Bell manufacturing affiliate has meant that Bell System operating companies pay only "65% to 85% of what they would have paid if [equipment had been] purchased from outside suppliers."

Programmers Nonprofessionals, Court Says, Awards Overtime

(Continued from Page 1)

time, he said. In such a case, overtime would be paid directly to GTE, which would not necessarily then pay that entire amount to the programmers.

Neither GTE nor the plaintiffs could find any previous cases on this issue to be entered as precedent, Bailey said.

GTE was ordered by the court to pay the programmers for the overtime hours worked, which will cover between 3,000 and 4,000 hours, Bailey estimated.

It was also determined that the company had deliberately refused to pay overtime while aware of the law and so must pay liquidated damages of double the amount.

The total amount due the plaintiffs will be between $60,000 and $100,000, Bailey said.

GTE has filed a motion to reconsider the liquidated damages and is still considering whether to appeal the decision, J.M. Rosen, attorney for the company, said.

On the Inside This Week

NEWS

User countersues HIS for Lack of Software Support 4
System 'Reads' Printed Pages to Blind 6
DP Aids Journalists and Officials in Winter Olympics 7

EDITORIAL

Editorial: Shaky Assumptions 8
White Hat, Black Hat: Artificial Intelligence 9
Taylor Report: Descriptive Billing Not Properly Handled . .9
NAS Board Stood for Technical Objectivity 10
Documentors Should Write, Have Technical Background . .13

SOFTWARE & SERVICES

SAS Turns SMF Data Into Plotted Paging Information . . .15
Kiviat Graphs and Single-Figure Measures Evolving 17
'Optimus' Ups DOS Throughput .18

COMMUNICATIONS

AT&T Hikes Interstate Data Rates 19
Special Carriers Win Points for Reliability, Repairs 19

TERMINAL TRANSACTIONS

Switch to Nationwide Net Revolutionizes Processing 20
GIC POS Devices Offer Unitote/Regitel Compatibility . . .21

SYSTEMS & PERIPHERALS

COM Often Not Compatible With Report Generators 23
Prospective Hardware Buyers Must Look Beyond Specs . .25
CAI Scores High With Students, Boosts Achievement 27

MINIWORLD

Peripherals of Future to Lower Total Systems Costs 29
Datasaab Device Handles Accounting Tasks 30
Wyle Computer Designs Modular Micro 31

COMPUTER INDUSTRY

Past, Present IBM Competitors Evaluate Their Fates 32
FCC Wants to Decide U.S. vs. AT&T Gray Areas 32

FINANCIAL

NCR Earnings Down 17% in '75 .35
Performance of DP Stocks Hearty in 1975 46

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User Countersues HIS for Lack of Software Support

By Molly Upton
Of the CW Staff

DENVER – A user is countersuing Honeywell Information Systems (HIS) for $39.85 million here, charging breach of contract, fraud, negligence and misrepresentation.

Filed by Colorado Hospital Service (CHS), the suit charged HIS failed to produce the promised level of support in a joint software development project.

The litigation started when HIS filed a $35.3 million breach-of-contract suit against CHS.

HIS claimed $30 million in damages representing lost profits caused by the lack of a complete system it could demonstrate was capable of "promptly adapting" to handle national health insurance as well as Blue Cross/Blue Shield (BC/BS) claims.

In addition, HIS said it lost $5.3 million through the commitment for equipment, software and services.

The CHS counterclaim seeks $9.85 million in compensatory damages and $30 million punitive damages plus interests and costs.

At issue appears to be not only a written contract for equipment, but an oral agreement for the joint development of software that would enable HIS to demonstrate its system's capabilities in handling a variety of health-claim procedures.

An HIS spokesman said the firm declined comment while the matter is in litigation.

According to HIS, CHS contracted for a five-year lease agreement on a 66/60 on Sept. 30, 1974, which was cancellable within 45 days. Software was ordered in December.

In January, CHS ordered an additional leased 66/60. Then in March CHS modified its original lease order to an installment/purchase agreement.

When the software was available for delivery May 1, CHS refused delivery, thereby breaching this contract, HIS said.

About April 9, CHS indicated it was repudiating all its contractual obligations to HIS, which it did "without justification," according to HIS.

Prior to these orders, CHS had a Honeywell 6040 and IBM 370/158.

The HIS suit did not specifically mention which party was to develop the software that would enable the system to perform national health service claims, but internal HIS documents filed by CHS indicated it was to be a joint effort (see related story).

The system was "to be made available to BS/BS plans throughout the U.S.," HIS said.

The "defendant was to directly license potential users of the defendant's special software," HIS continued.

At the time of the initial agreement, CHS "was aware the plaintiff was relying upon this project to demonstrate the ability of the new Colorado BC/BS system to perform claims processing . . . and, as upgraded, the capability of promptly adapting to whatever national health program Congress might enact."

The "plaintiff made financial projections and plans for sales of additional equipment to other parties based on such demonstrations and upgrading," HIS said.

According to CHS, it ordered an HIS 66/60 system only after HIS orally promised considerable aid in converting from its IBM 370/158 system and the development of a national health information system.

When CHS saw the level of support HIS was prepared to give it, it realized the timetables agreed upon were unrealistic and canceled its contract, CHS said.

In addition, a preproposal study of the CHS situation and needs which was "conducted in a wanton and reckless manner and negligently carried out," was the basis on which CHS entered into the oral agreement, CHS said.

HIS promised in an oral agreement to supply systems engineering personnel to analyze CHS requirements and implement data base-dependent and applications programs to handle management control systems and Medicare A and B processing.

Other programs to be developed were financial systems, online data collection and inquiry systems and capability for national health insurance processing, when and if enacted by Congress, CHS said.

HIS breached its oral agreement by supplying inadequately qualified personnel for systems engineering work, by improperly analyzing the needs and by failing to provide appropriate resources, manpower and vendor application packages, systems analysis and flow charts to adequately perform its obligations, CHS charged.

Furthermore, HIS refused to provide resources necessary for CHS to carry out its obligations under its oral agreement, CHS said.

HIS also breached the warranty made in its oral agreement to convert existing CHS programs on IBM equipment to HIS gear no later than April 1976, with data base design accomplished in parallel, according to the defendant's complaint.

Failed Previously

Although HIS professed to have "unique expertise" in the field of hospital and health care DP systems, it knew or had reason to know it was not "sufficiently experienced or expert in the field" to accomplish its part as specified in the oral agreement, CHS said, since HIS had attempted and failed in previous such attempts.

Furthermore, although corporate management knew its preproposals being made to prospective customers who were BC/BS carriers could not be implemented as outlined, it encouraged them, CHS charged.

The CHS brief called this tactic "bait and switch," enticing customers into the fold, then "locking them in" through "fraudulently inducing them to sign certain 'written agreements.' "

Not only was Honeywell management encouraging this type of study, but it intended to and did commit "resource allocations" and manpower allocations in offices involved with the CHS agreement "in gross and wanton and reckless disregard for the well-being of customers," CHS charged.

Project Seen Enlarging HIS' BC/BS Market Share

By Molly Upton
Of the CW Staff

DENVER – A joint software development project by Honeywell Information Systems (HIS) and Colorado Hospital Services (CHS) was seen as the cornerstone to enlarging HIS' position in the Blue Cross/Blue Shield (BC/BS) marketplace, internal HIS documents filed with the court hearing the CHS countersuit here indicated.

The Colorado organization is "highly respected" by other BC/BS carriers, and, with the installation of the dual 66/60s, would be solely a Honeywell shop.

The documents indicated that if the system is acceptable by the Federal government for national health care insurance processing, should that be passed by Congress, "the potential equipment value could be as high as $50 million to $100 million.

"Based upon the implementation plan for this project, HIS should be the first major vendor to offer a data base communications-oriented health system," the documents said.

Follow-on business for CHS alone, when national health care insurance is enacted, was estimated at $3 million to $6 million."

"System completion in 1976 will place Honeywell in an excellent position to capitalize on national health insurance when enacted," the memo stated.

"System developed will be transportable to other BC/BS plans, generating a potential of $20 million to $32 million ($4 million each) in additional equipment."

To perform, the memo outlined that HIS should assume costs for personnel to assist in "conversion, communications, data base design and project management as well as making available equipment on which to develop/test converted and newly designed systems."

The memo, written after the agreements with CHS were signed, also indicated "no special contractual agreements have been written and no special software/hardware is proposed other than that currently offered."

'Extremely Optimistic'

One document said the firm had tried to be "extremely optimistic" when drawing up its implementation schedule.

"Our attempt is to convince BC/BS we have an easy and quick solution to the total conversion effort."

A strategy outline indicated the firm was not required to prove its technical expertise nor its technical capabilities . . . the current . . . project on H-6040 was a major factor in overcoming this point."

In a document, the unknowns on the software project were discussed. These include methods of changing indexed sequential files in the membership and claim area to HIS' IDS data base files as well as conversion of programs going from the 370 to the already-installed 6040, the number of which is unknown, but which are all "somewhat interrelated." This makes it difficult to bring over one system at a time, HIS said.

On Aug. 5, 1974, an HIS official outlined the three alternative methods of converting indexed sequential files, recommending the quickest method, which was to keep the data base as an indexed sequential data base and do a straight Cobol conversion on all processing programs with redesign of I/O inquiry functions.

The optimum approach in terms of end result, but which appeared to be prohibitive in terms of time, was to design an IDS data base, then redesign all processing programs to access this IDS data base, he said.

The third alternative was to design an IDS data base and then redesign the I/O portion of all processing programs to access the IDS data base.

DP Speeds Criminal Identification

HOUSTON – Crime victims soon may be able to speed up the process of identifying a suspect by giving a general description of the offender to a computer.

The computer would then select from its digitized memory bank only those suspects who look like the description for examination by the individuals who saw the offender.

The pictures – computer printous – could be brought to the victim or witness wherever he is – be it home or hospital – thus saving hours of tedious searching through huge volumes of confusing mug shots and/or days of recovery time before a victim might be well enough to come to the police file room.

Computerized "pattern recognition," the process that would make this possible, is being refined at the University of Houston under a $226,000 grant from the Law Enforcement Assistance Administration.

Dr. Ben T. Rhodes, associate professor of engineering here, and several colleagues developed the system and have put it through limited testing.

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System 'Reads' Printed Pages to Blind

By Catherine Arnst
Of the CW Staff

CAMBRIDGE, Mass. – A computerized desktop machine that "reads" printed pages to blind people has been introduced by a small research firm here.

The device was developed at Kurzweil Computer Products, Inc. by the company's 27-year-old president, Raymond Kurzweil. Called the Kurzweil Reading Machine, it can "read" any clearly printed typeface and "speaks" English in a halting, sing-song voice, Kurzweil said.

To operate it, a person places a printed page on a glass-top scanning device. A camera scans the lines which are then processed to separate characters.

The recognized characters are arranged into words that are fed into a Votrax voice synthesizer which can read aloud at about 200 word/min.

A braille keyboard allows a blind person to operate the machine himself. Controls enable him to make it stop, repeat itself, slow down or spell words.

A Data General Corp. Nova minicomputer does the processing, but the scanning unit was developed by Kurzweil. The program is written in Assembler; all software was developed in-house.

Kurzweil first became interested in the concept of a reading device for the blind five years ago while working on pattern recognition as a student at MIT. His company was formed two years ago solely to market his invention.

Although the device will not be on the market for another 18 months, it was demonstrated in January to the National Federation for the Blind, which was very enthusiastic, David Boucher of Kurzweil said. The federation is developing its own testing programs for the machine focusing on employment opportunities for the blind.

The Kurzweil Reading Machine

Kurzweil is also conducting test programs at Perkins School for the Blind in Boston and the Boston public school system and received funding in July, 1974 from the Department of Health, Education and Welfare.

The most obvious application of the machine is in the education of blind children, Boucher said, but it can also be used in continuing-education programs for blind adults and to expand job opportunities.

When the machine is first marketed, it will be priced at $25,000. In six or seven years the price should drop to between $5,000 and $10,000, enabling blind people to have the machine in their homes, Boucher said.

Software Gallery Caravan Feature

NEWTON, Mass. – The Computer Caravan has expanded its exhibit format to include "The Software Gallery," a section of displays on software products and services.

This section will not be staffed by exhibiting companies, but by a representative of the Computer Caravan. Attendees will be able to tour the gallery at their own pace and fill out cards requesting additional information.

Computer Caravan staff will be responsible for getting these requests to participating companies, according to Avery Blake, president of The Conference Company, which manages the Caravan for its sponsor, Computerworld, Inc.

The Software Gallery will enable attendees to get broader exposure to the many software products available today, Patrick J. McGovern, chairman of the board and publisher of *Computerworld*, added.

To assure attendees of the quality and stability of participants in The Software Gallery, McGovern continued, these companies must comply with at least one of three eligibility criteria:

- Be a member of the Software Industry Association.
- Have annual software sales of at least $500,000.
- Receive "user evaluation ratings" which rank them as a member in the Datapro Corp. Software Honor Roll or which give them honorable mention.

Increased Software Orientation

The Software Gallery also brings an increased software orientation to the Computer Caravan, and this is "especially appropriate since software represents an increasing percentage of user budgets, both in terms of in-house programming staff and outside packages and support," McGovern said.

This increased software orientation can also be seen in the program of the Caravan, he said. On the second day (Wednesday) in each city, the entire program is devoted to "Software '76" and will include workshops conducted by users on the selection and use of several types of packages.

The Computer Caravan begins its nine-city tour March 2 in suburban Boston and then visits New York; Washington, D.C.; Atlanta; Detroit; Chicago; Dallas; Los Angeles; and San Francisco.

'Turnkey' System Tests Performance

(Continued from Page 1)

concurrency data).

T-Pac B provides regional mapping for up to 16 identifiable areas of memory. It also provides detail mapping on activity for a selected area of memory for a short period.

A standard MS32 configuration includes a minicomputer and 32K-byte memory; two or three disk drives; 18 to 144 sensors; up to two 24-bit comparators; up to two sets of distributor logic with plugboard; a keyboard printer; and a front-end data collection system.

The MS32 costs from $29,000 to $57,000 with lease plans available. Shipments will begin in March from the firm at 7900 Westpark Drive, McLean, Va. 22101.

Barbados Abortion Bill Studied

BRIDGETOWN, Barbados – Although it was earlier reported that food and population data provided by a minicomputer led to passage of an abortion law here [CW, Sept. 17], no such law has yet been passed, the Barbardos Ministry of Health and Welfare said recently.

A statement from the Government of Barbados said, however, that "A National Committee was formed to submit suggestions to the Ministry of Health for the drafting of such legislation. The Ministry is now considering the draft report of the Committee."

The misunderstanding on the status of the act arose from a letter received by Dr. Paul Handler, who wrote the program under the sponsorship of the Agency for International Development and the National Science Foundation.

Because of the wording of the letter and shades of misunderstanding, he had understood the legislation had been enacted, not merely presented, Handler said.

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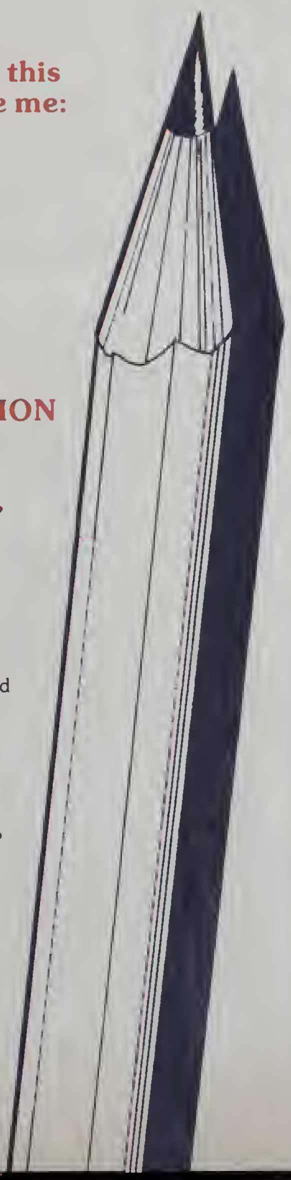

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40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/ Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government - Federal/State/Local
90 Printing/Publishing/ Other Communication Service
95 Other:

TITLE/OCCUPATION/FUNCTION
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/ Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other:

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Artificial Intelligence and Natural Stupidity

John Pierce and some prestigious buddies blew the whistle on computer translation of human language a decade ago, and things have been remarkably quiet on that unhappy front ever since. I have no illusions that I can do the same for AI; I don't have the backdrop of the National Academy of Sciences and/or Engineering, of the National Research Council, or of the soggy but delightfully rich National Science Foundation. Moreover, the combatants – guerillas, I would call them, except that it changes the metaphor from World War I to Chairman Mao – have learned from the mechanical translation battlefield and have excavated their dugouts very much deeper.

The desirability of at least lobbing a few hand grenades into the adits came to me with some force the other day, while unpacking the zillionth carton of old papers from my Boston move: came across the transcript of the ex-RAND symposium of 1966, Freddie Gruenberger's ninth masterpiece of oral/aural decipherment. It happened to have been boxed with some SIGART (ACM Special Interest Group on Artificial Intelligence) newsletters of recent vintage, and the contrast between the rehearsal of Hubert Dreyfus' famous (infamous?) paper, a red-hot item in the fall of '66, and the grinding glosses of '75 in the SIGART publication was remarkable.

Deeply dug in, the specialism and its funding fathers at NSF have simply ignored the decade of criticism. Even more remarkably, they have brushed aside the gigantic lack of progress in the field, if readers will pardon the Irishism; indeed, "gigantic," like the labels on canned olives, is a mild adjective.

Over and over again cooler heads in the trade, even including some forthright academics, have pointed out three fatal flaws in AI. The most obvious is the continual weasling on a working, outside-world definition. The second is the plateau phenomenon: progress at first, much less later, negligible recently. And the third is the calving off and abandonment of the areas where AI might have paid back the taxpayers' investment – the "Ugh, it's practical!" syndrome.

What *is* artificial intelligence? Or to be more precise, I guess, what is AI research? The talks, the papers, the books don't agree. The obvious answer is of course implicit in the name: to create another source of conversation in our universe, higher than dogs or chimpanzees or dolphins. Call it, "We're lonesome!" The idea recurs many times annually in science fiction – the friendly, the benign, the take-charge robot. But that's undignified. Or is it? Chess is in some sense a conversation; highly stylized, fully mathematizable, but still a form of intercourse between intellects.

Or how about self-organizing systems? Remember the perceptron? Remember the Japanese investment in AI *vis a vis* elaborate character recognition? Of course we *did* make a crack at self-organizing networks with the ARPA boondoggle, but that was presumably unintentional – and it failed, in any case!

And there is the semantic area: what means "meaning," what means "the meaning of 'meaning'," and so *ad infinitum*. That leads off toward question-answering systems – ah, dear DEACON – and the fancier forms of information retrieval; great stuff, if we could do it. Any of these directions, in fact, lead to enormous intellectual and practical victories, if only we might hope for results.

That brings up the second criticism: stagnation. Regardless of exact definition, there was genuine excitement a decade ago. Some was misguided, some was actually fradulent, but in some sense there was progress, or the hope of progress. Now we have sterile arguments, abstruse theorizing, uninteresting "results." It was so in the language translation thing earlier, and would have been so in question-answering if it had survived.

What I personally encountered in the latter area was the opposite of the learning experience with human acquisition of a new language. The first bits of French, of Japanese are of course trivial: "oui," "non," "arigato." But then comes bitter, hard work – the irregular verbs, the semantic barriers. Finally, although I never got there in French myself, it becomes easier: new grammar rules, new vocabulary comes smoothly and with little conscious effort. Piaget and others say this is so for one's native language also, at a much earlier age of course.

That doesn't seem to happen in chess-playing, or in theorem-proving. It certainly didn't happen in DEACON, or with the perceptron deal. Something deep, deep in the nature of AI research, or deep in the understanding and execution of our human learning process at academic level, differs from our successes as children – our intrinsic "intelligence."

What I would like to see is referred to under the third fault above: the shucking off of the practical successes of the AI or near-AI racket. I'd like to see the name "artificial intelligence" abandoned, and the theoretical stuff near the presumed central area very much diminished (by withdrawal of most grants thereto). I would then split up the more practical work explicitly into separate disciplines or trades, openly supported for what they are: learning processes – much caution needed here; it's mostly junk – chess playing, and other games; character recognition, font evaluation and the like; giant system characteristics – the Bell people are always amusing at this, if they would downplay occasional solecisms like "immortal."

I'd increase support for much of this, in IBM, from the Feds and the private foundations, and overseas. But I'd only do so if explicit, layman-language goals were agreed on, and measures of practical progress. I'd leave the "pure" stuff out: yes, someone should work on it – but not very many people, or at many places, and they should do it as a labor of love, not to grovel for grants.

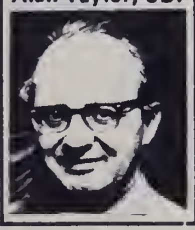
AI is currently described and supported as a waste of time and *human* intelligence. As I wrote some years ago, artificial intelligence is to intelligence as artificial insemination is to insemination: profoundly unsatisfying!

Herb Grosch

Process Deteriorating

DP Not Yet Properly Handling Descriptive Billing

The Taylor Report
By
Alan Taylor, CDP



The Association for Computing Machinery's (ACM) New York ombudsman panned descriptive billing some years ago and was rewarded with a resounding silence for his efforts from that organization. Since then, I have been watching the descriptive billing process deteriorate, so proving his point that we are not ready for it.

A year ago, for instance, a leader of one of the major societies sent me a bill he had received asking him to pay for a "retail purchase" without any other description. He apparently had no where else to go even to complain.

At the time there wasn't any space in the column for it, so I let it go. However, the deterioration has since then continued. Now, in some systems at any rate, the only thing left of the "description" is the label that is applied in the name field!

Perhaps my favorite example of just how poor the systems are is a little bit out of date; it is a statement issued some three months ago by a Boston bank to cover a California purchase. The statement shown in the box was unusual in that it was accompanied by the full bank explanation of the system and also because it showed the problems of two other computer confusions.

Merchant Name Only

Now, no one can say that a "description" doesn't appear on the BankAmericard statement. The word "description" itself is the largest on the whole form, and heads a three-field area 23, 13 and two characters long respectively.

However, although the enclosure accompanying the statement, "Introducing descriptive billing," claimed the transaction is briefly described, the information in the field turned out to be merchant identification, city and state. That's not a transaction description, brief or otherwise, but it is the only thing the peddlers of descriptive billing are now giving out. That is, unless you can read the meaning of the long reference number.

Now, this just is not – and has no right to be called – descriptive billing. This is simply a technical rip-off which simplifies the paper-control problems of the credit card people without giving any substantive help.

Descriptive billing is supposed to supply a description of the item involved in the transaction. This abortion of a system doesn't do that.

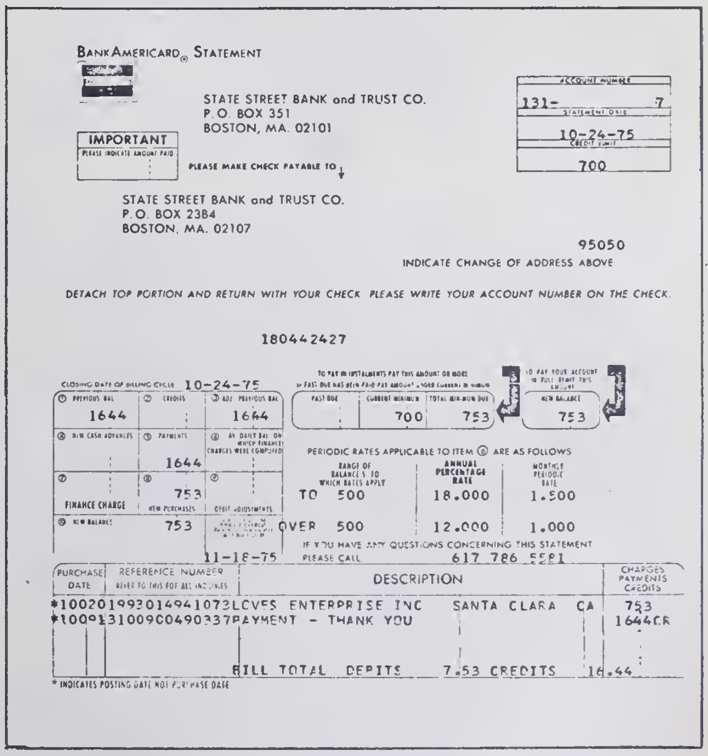
Banks of the stature of the State Street Bank and Trust Co. should not lend their name to these cheap Madison Ave. rapes of technical terms.

If BankAmericard wants its customers to pay against a list of alleged debtors, amounts and either posting or purchase dates, it should find another term for it instead of taking what little meaning is left in a concept that had many shortcomings in the best of times: claim-list billing, perhaps or indescribable billing. (The latter would be particularly appropriate.)

No Bottom Line

So much for the bill's terminology. How about the form's substance? It is too much, apparently, to expect BankAmericard to put balance information on the bottom line. Perhaps that's a term it wants to make as

(Continued on Page 10)



BankAmericard® Statement

STATE STREET BANK and TRUST CO.
P.O. BOX 351
BOSTON, MA. 02101

IMPORTANT
PLEASE INDICATE AMOUNT PAID

PLEASE MAKE CHECK PAYABLE TO

STATE STREET BANK and TRUST CO.
P.O. BOX 2384
BOSTON, MA. 02107

ACCOUNT NUMBER 131- 7
STATEMENT DATE 10-24-75
CREDIT LIMIT 700

95050
INDICATE CHANGE OF ADDRESS ABOVE

DETACH TOP PORTION AND RETURN WITH YOUR CHECK PLEASE WRITE YOUR ACCOUNT NUMBER ON THE CHECK.

180442427

CLOSING DATE OF BILLING CYCLE 10-24-75

① PREVIOUS BAL 1644	② CREDITS	③ ADJ PREVIOUS BAL 1644
④ NEW CASH ADVANCES	⑤ PAYMENTS 1644	⑥ AV DAILY BAL ON WHICH FINANCE CHARGES WERE COMPUTED
⑦ FINANCE CHARGE	⑧ NEW PURCHASES 753	⑨ CREDIT ADJUSTMENTS
⑩ NEW BALANCE 753		

PAST DUE	CURRENT MINIMUM	TOTAL MINIMUM DUE	NEW BALANCE
	700	753	753

PERIODIC RATES APPLICABLE TO ITEM ⑥ ARE AS FOLLOWS

RANGE OF BALANCES TO WHICH RATES APPLY	ANNUAL PERCENTAGE RATE	MONTHLY PERIODIC RATE
TO 500	18.000	1.500
OVER 500	12.000	1.000

11-18-75

IF YOU HAVE ANY QUESTIONS CONCERNING THIS STATEMENT PLEASE CALL 617 786 5581

PURCHASE DATE	REFERENCE NUMBER	DESCRIPTION	CHARGES PAYMENTS CREDITS
*1002	0199301494107	3LOVES ENTERPRISE INC SANTA CLARA CA	753
*1009	1310090049033	7PAYMENT - THANK YOU	1644CR
		BILL TOTAL DEBITS 7.53 CREDITS 16.44	

* INDICATES POSTING DATE NOT PURCHASE DATE

The statement above is officially called "descriptive billing" and was claimed to have been designed to provide users with "clear, prompt, accurate information in an easy-to-understand format. Previously BankAmericard users had received copies of the individual sales drafts, but now these are being kept by the bank the merchant happens to deal with and whose name the customer was not told.

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Reader Commentary

NAS Board Stood for Technical Objectivity

By Anthony G. Oettinger

Special to Computerworld

One of Herb Grosch's recent columns, "Exports and Security" [CW, Jan. 19], contained ugly inuendoes about the late Computer Science and Engineering Board of the National Academy of Sciences (NAS).

To hopefully set the record straight, I would like to repeat here part of an address I made to a plenary session of the Fall Joint Computer Conference in December 1972:

"How the U.S. stands relative to the Soviet Union, Japan and other countries in developing and using computers and allied technologies has been of concern to the Office of Science and Technology in the Executive Office of the President of the U.S., to the Department of Defense, to the Department of State and to the Department of Commerce in connection with our export policy.

"This policy affects every American in such varied terms as defense, goods and services, jobs, profits and prices. Since 1968, when it was formed, the Computer Science and Engineering Board has made several studies for the government in this area, each in response to requests by a consortium of the four agencies I have mentioned.

"Each of these agencies has particular responsibilities, hence particular outlooks and policy preferences. All saw some common need for an objective and broadly based technical judgment of our nation's current standing in computer technology and of the implications of future trends. Judgment of this kind must draw on the best information and the most competent people available anywhere in the public or private sectors.

"Whether the subject is export policy or any other topic of national significance, certain conditions are necessary if the advisory process is to serve the nation – and not just to put the rubber stamp of expertise on the foregone conclusions of a particular government agency or a particular private interest.

"These conditions include searching for the facts, whatever their source, and they include discretion about information that is sensitive whether for personal, proprietary or security reasons; they include searching for nationally important principles to follow rather than seeking a lowest common denominator of agreement; they include independence enough to withstand pressures to serve only the special interests of a government agency or of a private party; they include independence enough to refuse terms of reference that already define the conclusions and independence enough to suppress no alternative that professional judgment deems significant."

Oettinger is Gordon McKay professor of applied mathematics, a professor of information resources policy and director of the program on information technologies and public policy at Harvard University.

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Handling of Descriptive Billing Still a Stumbling Block for DPers

(Continued from Page 9)

meaningless as "descriptive." Instead, it put an off-center credit total. The accompanying explanation doesn't mention this possible entry or even how or where to find a person's balance.

The balance is there in two places. It's under Item 10 and also in a box noted "To pay your account in full remit this amount." So leaving a bottom line out is just the typical poor forms design and explanation that seems to be endemic to the banking/credit card industry.

Why? It can't be that they can't pay for talent. So it must be in the conditions of service or their unwillingness to pay.

No Punctuation

More disturbing are the entries under "purchase date" and "charges payments credits." Not content to remove the meaning from words, BankAmericard also flies in the face of traditional wisdom by discarding decimal points between dollars and cents and slashes between month and day in a date.

What happens when it does this can be seen. Apparently, a charge of over $75 was incurred – if you read the printed-line field markers on the form the way you are supposed to. To add to the mystery, this $75 charge was posted on the 20th of the 100th month of some undefined year!

Now, it's no good to blame the operators, one of the favorite alibis of poor form designers and programmers. The operators look at the top of a form to see whether it is in place. Look at the top yourself. It's OK. That account number is nicely centered in its box. The date looks good. What more can we ask an operator to do? Clearly the fault is not there.

A Better Place

Where exactly it is, I don't know. If designers would start realizing that traditional places for spaces, slashes, periods, etc. were put there for a purpose and stop just hoping that printing is going to be miraculously accurate, the world would be a better place.

If the State Street Bank and/or BankAmericard stopped trusting designers and took a look at the mess being inflicted on its customers, it would perhaps realize what image is being put out by these "advances." And if computer designers everywhere would look at the problem of placing fields correctly so that operators can check placement, a great advance in practice would occur.

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DP Dialogue

Notes and observations from IBM which may prove of interest to data processing professionals.

Technician Elizabeth Garcia wires the front panel of a chassis assembly produced by GTE Sylvania.

Structured Programming Eases Deadline Pressure at GTE Sylvania

A deadline had been set for completion of a complex management control system. If it couldn't be met, a major government contract would be lost.

That was the situation at the Western Division of GTE Sylvania's Electronic Systems Group in Mountain View, California. The division performs system development, manufacture and integration in the fields of reconnaissance, electronic defense and electro-optics for government and industry.

"In order to meet government requirements, we had to design a total system that could relate cost elements, scheduling and actual performance to every phase of the project," explains Gene Giannotti, manager of computer services. "That's a great deal of work to accomplish in a year."

Fortunately, the company had already geared for quick, accurate program development with a structured approach to systems design and programming.

"We've found that all facets of the structured approach—top-down development, modular design and structured walk-throughs—contribute to much more efficient overall project control," says Giannotti.

"The approach has enabled us to reduce debug time from about 50% of total programming time to practically zero," adds Pat Thompson, supervisor of application development.

The internal design of the Cost Schedule Control System (C/SCS) called for 50 different programs and modules to adequately define scores of requirements from the engineering, manufacturing and financial departments. That's why one of the primary principles of structured design—that all programs be broken down into small, functionally defined modules—was especially critical. Top-down development—working from the highest level of logic to detailed segments—was also significant.

"Using the modular approach, many programmers can contribute to the same program simultaneously," says Bill Inmon, chief programmer. "As a result, we saved a great deal of time."

At GTE Sylvania, initial data entry was keypunched. Subsequent compiling and "fine tuning" were done on IBM 3277 Display Stations linked via IBM's Time Sharing Option (TSO) to the division's System/370 Model 158 computer.

After each program was completed, it was submitted to a structured walk-through—basically a review session during which several programmers get together to analyze design logic, detect errors and develop test strategies.

"In addition to producing programs that are easier to maintain and modify, structured design and programming has proven invaluable to our engineers," says Donald Kiser, vice president and general manager. "Structured programming is far more logical and accurate than traditional approaches. It has helped us improve programmer productivity and the quality of our end-product at the same time."

DL/1 Speeds Growth at General Reinsurance

An online data base management system organized with Data Language/1 has resulted in faster communications as well as improved customer service for the General Reinsurance Corporation of Greenwich, Connecticut.

As the largest reinsurance company in the U.S., General Reinsurance assumes risks originally undertaken by other insurers in categories like property, casualty, fidelity, surety, aviation, marine and automobile insurance. It also covers specific individual risks for a fixed time period—for example, the hands of a pianist before a major performance. These are known as facultative agreements.

"It used to take a month or longer for new premium and claim information to be totally processed," recalls Frank Fahy, assistant vice president of business systems planning. "That included mailing time from the branch offices, coding and entering into the central data base. By the time corporate reports were consolidated and production reports were forwarded to account executives, some of the information was already outdated. Today, total processing takes just a few days."

"In addition to improved turnaround time, DL/1 enabled us to cope with a 39% growth in transaction volume in our facultative business last year without any additional staff," adds Tony Kandiew, assistant vice president of electronic data processing.

Beginning in July, 1974, General Reinsurance made the transition from a System/360 Model 30 with a conventional base largely on tape to a System/370 Model 158 running under DOS/VS and the online DL/1 data base system. Under the current system, data can be entered in realtime from any one of 30 display terminals located in the regional and local offices, and then be communicated back to the Model 158 in Greenwich through a Customer Information Control System Virtual Storage (CICS/VS) interface.

Under DL/1, all related data files are organized hierarchically with the most significant and frequently accessed data on the highest level. Normally, every new application program requires the formation of a totally new sequential data file. With DL/1, however, data is structured into a common format that allows many batch or online programs to access the same data. Data security is preserved by a segment sensitivity feature that locks users out of data files that are not required by their applications.

"We decided on the DL/1 data base approach because it offered the flexibility and data security we wanted without using too much memory," says Kandiew. "If we ever need to expand to an even larger data base, such as the Information Management System (IMS), we feel confident the conversion would be quite easy because IMS uses the same data entry format as DL/1.

"We eliminated a great deal of redundant data using DL/1," says Kandiew. "Before, the same premium information may have been repeated in 100 different files. Today, it appears only twice: in the premium file and in the balance file.

"Our data base management system forces us to define logical data relationships before creating a new file. By improving documentation, it has significantly reduced the time we spend on file maintenance and costly reprogramming."

Fred Schmitt, assistant vice president of information services, points out, "With more accurate and current status reports available using DL/1, our branch information services staff can supply our clients with a more comprehensive service package much earlier now. We feel DL/1 has helped us to achieve a much tighter control of our business."

The new, expanded headquarters of General Reinsurance in Greenwich, Connecticut, symbolizes the rapid growth of the company.

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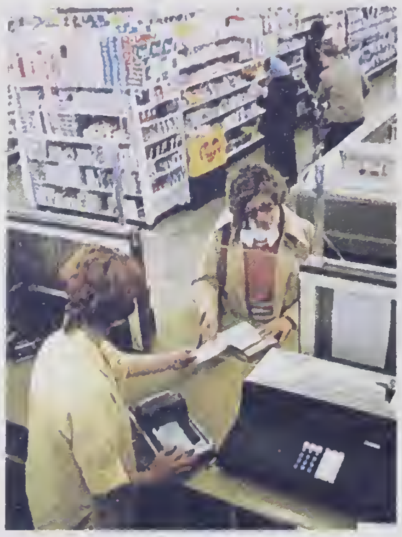


A customer makes a deposit directly to her savings account through an IBM 3604 teller terminal located in a Pick-n-Pay supermarket in Cleveland.

If there is one place the average family visits at least once each week, it's the supermarket. And they don't always come with cash in hand. As a result, supermarkets may dispense large amounts of cash to their customers, often in return for personal or payroll checks. And the faster they can do that, the sooner shoppers can be on their way.

"The supermarket business is incredibly competitive. So we're always looking for new ways to provide additional services to bring people into our stores," says Richard Bogomolny, president of Pick-n-Pay Supermarkets, Inc.

In a joint venture with The Broadview Savings and Loan Company, the Cleveland-based supermarket chain now offers a new service which it calls "The Money Service." It enables Broadview's customers to make deposits or withdrawals from their savings accounts directly through IBM 3604 teller terminals–part of the IBM 3600 Finance Communication System–located in 55 Pick-n-Pay stores. Broadview plans to move to the more compact IBM 3606 Financial Services Terminal sometime in 1976.

"In addition to extending banking hours–we're open until 6 pm weekdays and all day Saturday–the terminals mean people can keep all their money in interest-bearing savings accounts until the moment they need cash," says Bogomolny. "And it can all be done in one stop, right along with their regular grocery shopping."

The terminals, equipped with keyboards and display panels, are activated by magnetically encoded plastic "debit cards" issued by the savings and loan company. An operator simply inserts the card and then keys the cardholder's four-digit security code into the terminal, followed by the amount to be withdrawn or deposited. In a matter of seconds the transaction is completed. In the case of withdrawals, the customer can request cash up to a flexible limit determined by Pick-n-Pay –provided the account balance is large enough to cover the amount requested.

The terminals are online to an IBM 3601 Controller, a part of the 3600 system. The controller in turn communicates with Broadview's System/370 Model 145 virtual storage computer to ascertain account balances and to debit or credit accounts.

"Just two years ago, we had to enter all information manually, a process that used to take several minutes for each transaction. Now, with the online capability of the 3600 system, that time has been reduced to seconds," comments Broadview's president, John Rupert.

"Because of the tremendous modular flexibility the system provides, we were able to install all 55 terminals in a matter of a few weeks. They will enable us to bring financial services to our customers at a fraction of the cost of opening new branches."

APL Helps ABC Set a Fast Pace in the Ratings Race

At the ABC Television Network in New York City, the two questions most likely to be asked are "How did you like the show?" and "What's the rating?"

Ratings of TV shows are measures of their popularity, with a single rating point representing some 700,000 households which have viewed a given program. When a rating goes up or down, the Network's future advertising revenues may be affected. People at ABC involved with network planning therefore, keep an eagle eye on costs, revenues and ratings.

"We analyze network schedules and costs up to 78 weeks in advance," says Al Rubin, the TV network's vice president of business analysis and financial planning. "APL helps us meet our needs for analyzing financial changes related to new program schedules. Its speed and flexibility allows us to examine alternative schedules in hours instead of man-days. We can repeatedly adjust our data bases' input–costs, availabilities–in precisely the format desired, while avoiding elaborate computer reprogramming in accomplishing these tasks."

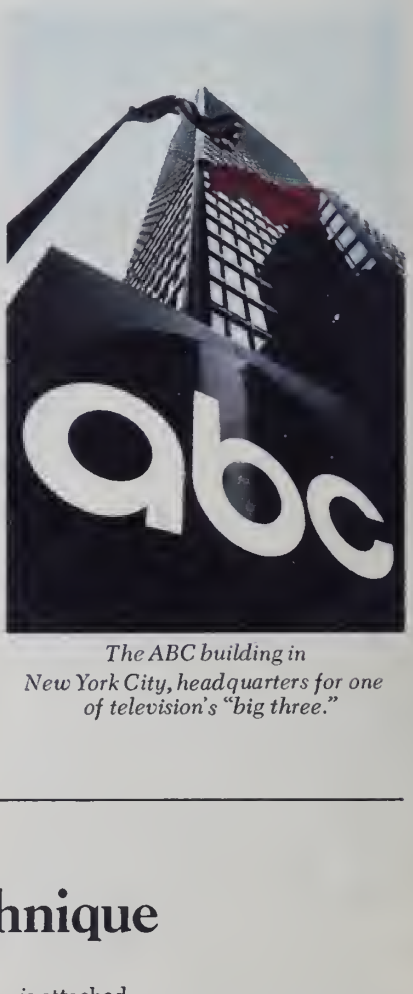
ABC uses an advanced version of APL called A Programming Language Shared Variables. Through the use of APLSV, a wide range of data bases are accessible. APLSV runs on one of ABC's two Model 158s under Multiple Virtual Storage (MVS).

"Contrasted with standard data base management, APLSV is far speedier and more flexible," says Marvin S. Mord, vice president of research services for the Network. "We get data breakouts with APLSV that were not possible before.

"To us, the most helpful feature of APLSV is the simple one-statement expression that manipulates entire data sets," he adds. "By hitting just six keys, for example, we can get the average of a large set of program ratings.

"APLSV helps provide answers to vital questions–such as what would happen if we shifted a show to a new time slot against different competition? What would the effect be on overall network performance? That kind of capability means a lot to us, because we always seem to be racing the clock in this business."

As Mark Cohen, vice president for finance and planning for the ABC Television Division, puts it: "APLSV gives us the ability to rapidly review and analyze Nielsen rating data. It's a particularly effective way of getting the information we need in the form we want."



The ABC building in New York City, headquarters for one of television's "big three."

Scientists Perfect Dental Implantation Technique

Until recently, replacing a lost tooth almost always required bridgework–anchoring the false tooth to the healthy ones surrounding it. Now, using a new technique, dentists at the University of Southern California are implanting artificial teeth directly into the jawbone. Their successful procedure uses vitreous carbon, a material new to dentistry, whose characteristics were tested on the university's IBM computer.

A vitreous carbon rod is implanted in the jawbone to serve as the foundation for a dental crown. Its use in dentistry was developed with the aid of computer analysis.

"The jaw is subject to constantly changing stresses that are created as a person chews," says Dr. Ronald Voss, director of the clinical implantation program at USC. "We had to be sure that artificial teeth made of vitreous carbon would approximate the behavior of normal teeth very closely. If there is insufficient stress, the jawbone will start to deteriorate. On the other hand, if the stress is too great, either the bone or the implant itself will break down."

Using an IBM System/370, Dr. Dale Grenoble, associate professor of dentistry, and biomechanics engineer Albert Knoell, developed a mathematical model of the carbon implants to determine their maximum stress patterns. "This computer analysis focused on one part of the problem by helping us verify the structural integrity of the implant design without incurring the time and expense of building actual models," says Knoell.

The implant operation, which normally takes about half an hour, involves drilling a hole into the jawbone and inserting a grooved vitreous carbon rod. After a healing process of several months, a stainless steel post is anchored to the rod and a dental crown is attached.

So far, implants have been performed successfully on more than 300 patients. "Our oldest implants have been in place just over four years," says Dr. Voss. "We believe that in certain situations, implants can be more aesthetic and functionally efficient than any other dental replacements."

DP Dialogue appears regularly in these pages. As its name suggests, we hope DP Dialogue will be a two-way medium for DP professionals. We'd like to hear from you. Just write: Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

76-1

IBM

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Reader Commentary

Documenters Should Write Well, Have Some Technical Background

By Joseph T. Rigo

Special to Computerworld

So who's going to do the documentation?

Would you believe a lot of people actually want the job? Times have changed. Vendors are lined up outside the data processing manager's office.

Some of the vendors are free-lance writers and consultants. Othere are selling courses and seminars.

A few represent big companies. They have software packages to sell or printing presses to keep busy.

In the course of all this, the term "documentation" has gained expanded meaning. It still applies to describing computer programs. But it also includes all the systems and management paperwork associated with a systems department or project.

Documentation includes a company's standards and procedures, user manuals and even the HELP commands that may eventually replace the user manuals for an interactive system.

Three Prime Areas

There are three prime areas of vendor activity. They are consolidation and republishing of existing documentation, presentation of documentation courses and seminars and free-lance technical writing.

In the area of consolidation, several publishers compete for the manuals business.

These companies consolidate the existing standards and procedures around a shop or the documentation for an important system. They retype the miscellaneous documents into a standard format and they publish the collection in an attractive binder.

The manuals companies may supply a writer. The writer helps the customer weed out obsolete material, insert revisions and updates and develop a page or paragraph numbering scheme, if needed.

The customer provides detailed guidance about the content and organization of the manual. The publisher's main expertise is in getting the material retyped and printed.

The effect is something like buying a new suit. The new package attracts attention for a while. Long-term success or failure still depends on what's inside.

The revived standard or capability may gain new life if it was well done in the first place. If not, it soon slips back into disuse and oblivion. Therefore, the customer should consider making major revisions before republishing.

There are, these days, an incredible number of English professors running around the country, telling programmers and systems analysts how to write like Ernest Hemingway.

Generally, they are giving courses in basic English composition with a few technical buzz words thrown in. They emphasize spelling, grammar and "good writing."

These courses say little, if anything, about the difference between functional and systems specifications, contents of phase-end reports or the use of comments in program listings.

These presentations can be helpful for foreign-born systems specialists. They also may boost the confidence of a staff member who is preparing a technical paper for a conference or publication.

In fact, however, most systems professionals write quite well enough. They just don't believe they do.

Our big need now is for a real documentation course. It would cover everything

(Continued on Page 14)

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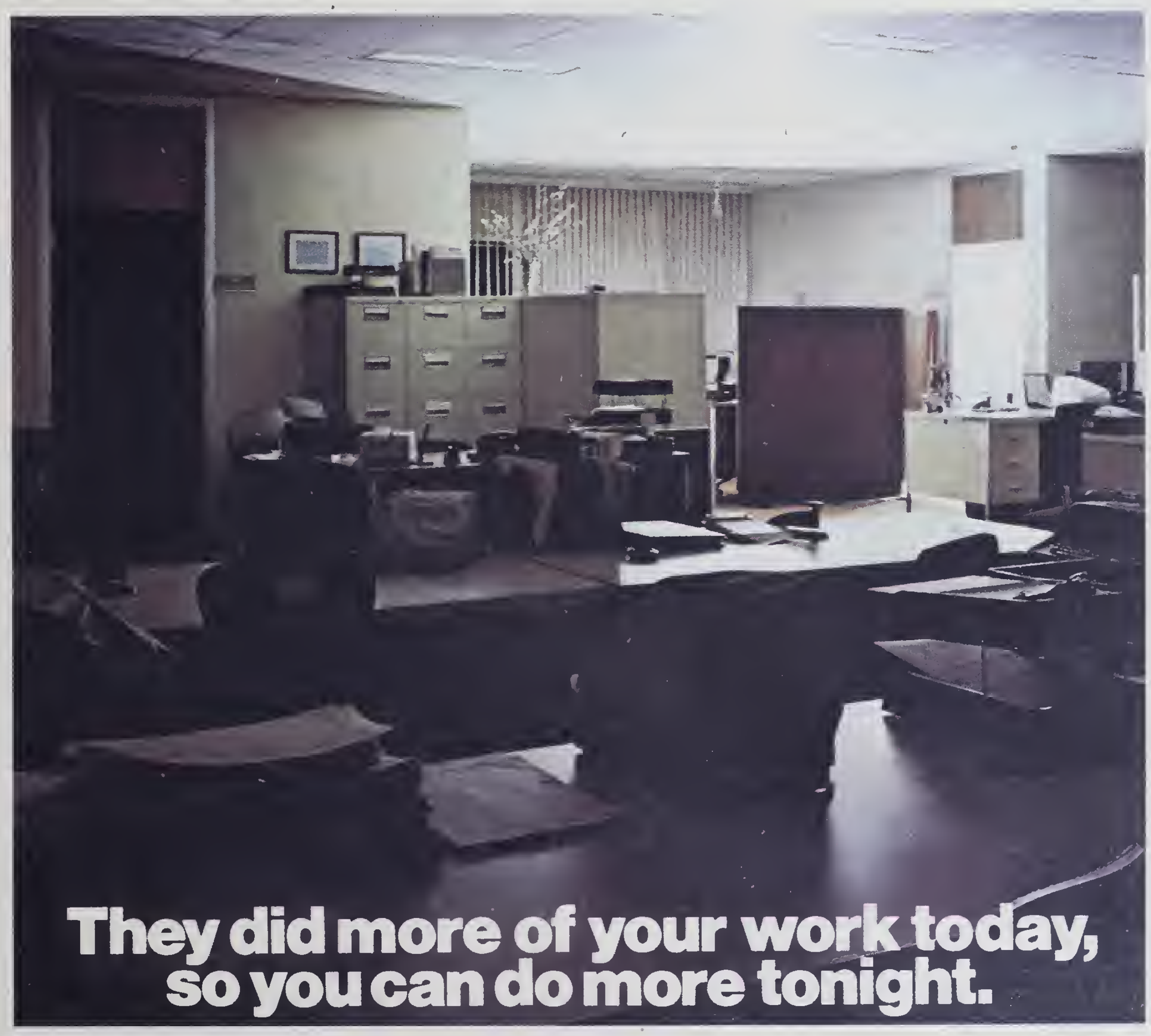
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As reported
by George Seeley
Supervisor of
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Writers Need Technical Skills

(Continued from Page 13)

from text editors to data base dictionaries. It would recommend what information to put into user manuals, how to select automated documentation packages to help produce them and what procedures to follow to maintain them.

On a more basic level, the course would teach skills in preparing graphics, charts and tables and quick reference cards. A great deal of computer systems documentation involves no writing whatever – just pictures and lists.

Technical Writers

Until recently, the technical writing profession was dominated by failed engineers.

These engineers started out as technicians in aerospace companies and flopped. They were friendly and agreeable, so they were told they could stay on the payroll if they would handle the documentation around the shop.

Some worked out. Others were just as bad at writing as they were in engineering.

Meanwhile, the computer systems business has produced its own crop of writers. They are writers by choice, and they have training in computer hardware and programming.

Managers need not grope in the dark any longer. They can apply the same professional recruiting standards to writers they do when interviewing programmers or systems analysts.

A prospective writer should be able to demonstrate an above-average interest in writing. Everyone writes term papers in school or letters to mother. A professional writer also worked on the school paper, edited the computer science department newsletter or turned out speeches for a local politician.

If he has been out of school for a while, he should be able to talk about something besides spelling and grammar. He should be able to show he can go into a job with no written source material whatever and turn out a product.

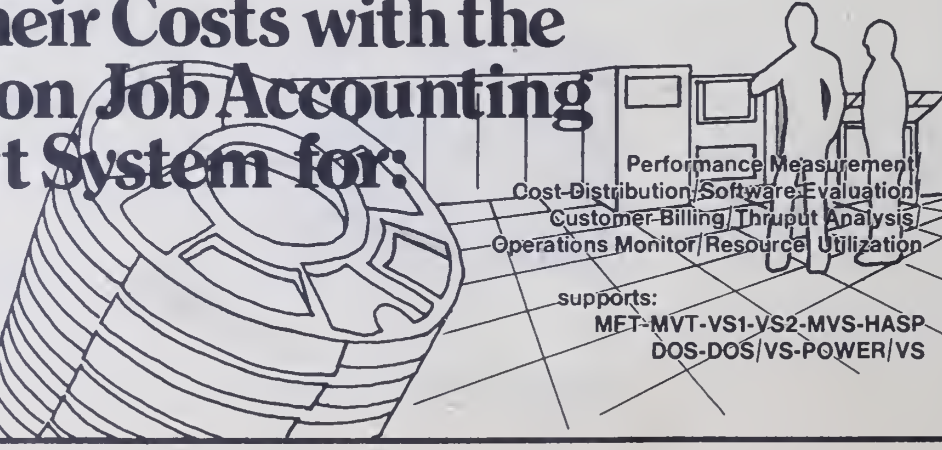
Most important, he should be ready, willing and able to use whatever system he will be documenting. He need not be an expert – or even good – programmer. But he should code, test and debug every example in his documentation.

A writer only learns about a system when using it. Programmers, analysts and managers mean well when they tell him how it works, but they forget things. They forget important things.

The writer learns about them only by running applications himself.

If the writer can't do this, the manual may get an "A" in English, but it will leave the user high, dry and angry at critical points.

Rigo is a free-lance writer and consultant in New York, N.Y.



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Firm Finds 158's Thrashing Point

SAS Turns SMF Data Into Plotted Paging Information

By Don Leavitt
Of the CW Staff

NEWPORT BEACH, Calif. – The Statistical Analysis System (SAS) from North Carolina State University is a data-reduction package often applied against application files.

But it is also "very easy to use" with System Management Facilities (SMF) data, according to J. Frank Chambers of Avco Financial Services here, and that makes SAS "one of the most important developments in performance aids in a long, long time."

It was through SAS, the senior systems programmer noted, that Avco found 30 page/sec is about when thrashing – the point at which a system spends more time moving pages in and out of memory than in productive work – occurs on its system.

This paging rate is just about the thrashing point for any IBM 370/158 with 3330 disks running under OS/VS2 (MVS), and it is probably not peculiar to Avco and its job mix, Chambers added.

Thrashing might depend on page spaces, he said, and a user should do a correlation study similar to Avco's to find his own thrashing point.

'Duck Soup'

But, with SAS, such a study is "duck soup," the performance analyst added.

First of all, Avco – or any user – has to find out when the system being studied is performing well and when it is running poorly, he said. Chambers imposed no definition of what constituted good or poor performance, leaving that to the individual user to decide.

IBM's SMF generates and stores records showing system resources used by job and by job step. Under the MVS releases of VS2, records reporting paging rates are also generated and stored. Avco has used SAS to "capture" those paging statistics and to break them down by type, Chambers said.

With Avco's routine, SAS separated these statistics into linkpack area paging, swap paging and total paging. Then, with another SAS facility, Avco formatted a plot with lines – "well, really a series of points identified by a key" – for cach kind of paging over time.

With such a plot, the user, as Avco did before him, can try to correlate some level of paging with poor performance. Once that connection is made and confirmed over time, the user should put his efforts into keeping the paging rates within what appear to be acceptable limits.

Danger Line

Because Avco has recognized 30 page/sec as its danger point, the plot of paging rates includes a horizontal line at that level. Later, the company determined that 10 page/sec was the maximum acceptable paging rate for the linkpack area, so another line was added to the plot at that level.

Now the analysts have an output which turns data into information and shows them at a glance when they had trouble during the period covered by the plot.

As long as they keep the system tuned and jobs scheduled so the thrashing point isn't touched on the plot, the user doesn't necessarily have to look at any other performance data, Chambers noted.

Little Effort Required

That sounds simple, but how much effort is required to make SAS produce the desired paging breakdown and plot? Anyone with about 15 minutes of programming can do the same thing, the analyst said.

The objective of the SAS developers, according to Chambers, was to produce a language that can be used by problem solvers who are not programmer types. The result, "is a PL/I-like language that is easy to work with," he said.

A new version of SAS is coming out, Chambers said, and it should make processing of even "complicated" SMF records with variable sections and relocate sections "just plain casy."

In any case, he said he might forward his SMF-based SAS coding to North Carolina State so the developers, if they wished, could distribute the routine along with the package.

SAS requires a user region of 120K bytes and runs in batch mode or under Time Sharing Option (TSO). The package is available for $1,000/year ($600/year for degree-granting institutions) from Dr. James H. Goodnight at the Institute of Statistics, North Carolina State University, Raleigh, N.C. 27607.

Isam Support Highlights Package Offered Datasystem 350 Users

NORTH ANDOVER, Mass. – Five programs designed to simplify use of the Digital Equipment Corp. Datasystem 350 under COS have been put into a single package by Business Systems Research (BSR).

Capabilities in this collection are said to include support for indexed sequential (Isam) files, program development on more than one terminal at a time, input editing and field display on CRT devices and for examination and modification of any data file without special programming.

The Isam support routine runs in less than 1K of core and provides access to records by keys (up to 30 bytes long) or sequentially. Files may be up to 20,000 records long and new records can be accessed immediately.

The program development tool allows code creation and modification while the time-shared Dibol operating system is running. The command language supported by this software is said to be identical with that of the DEC COS 300/310 systems, "reducing learning curves significantly."

The keyboard data input and CRT display routines handle DEC's VT50H, VT52 and VT05 units and accept alphanumeric data performing numeric checks as required. They are able to work with fields up to 72 characters long and capabilities include character and field rubouts, the vendor said.

The dump and fix technique (Daft) routine allows retrieval and updating of "any" data file without writing a specialized Dibol program, BSR said. The command structure available under Daft is said to be exactly like the one DEC provides through COS on the Decsystems 300 and 310.

The entire BSR package can be acquired for $1,500 from the firm at Suite L11, 451 Andover St., Andover, Mass. 01845.

HIS Generator Simulates TDS/TSS

WALTHAM, Mass. – Users of Honeywell Information Systems (HIS) Series 6000 and Series 60/Level 66 systems apparently will be able to simulate the effect of peak demands on their Transaction Driven Systems (TDS) and Time Sharing Systems (TSS) with a TDS/TSS Load Generator package now available from HIS.

Developed and still owned by Information Systems Consultants, Inc. of McLean, Va., the package allows rapid performance evaluation, assists in implementing new hardware or software releases and provides a benchmarking tool to pinpoint exact hardware requirements for a projected workload, HIS said.

The TDS/TSS Load Generator simulates peak demands before the user adds either hardware or software. In effect, before any change in the actual environment, the user can debug and guage compatibility of planned activities or transaction loads with existing systems, especially those activities that are interactive, the spokesman added.

Apparently aware that the load generator itself adds an overhead, Honeywell noted use of the package allows an installation "to monitor activity between the TDS/TSS Load Generator, Transaction Driven System and Time Sharing System."

Designed to run under the Gcos environment, the load generator is available under a one-year license for $300/mo.

The inquiries center for HIS is at 200 Smith St., Waltham, Mass. 02154.

Accounting IV Gains Flexible Reporting

WOODLAND HILLS, Calif. – The Universal Report Generator (URG) module from Informatics, Inc. is intended to augment and enhance the specialized financial report writers in the Accounting IV packages so users can create virtually any report they want, the vendor said.

The Accounting IV family of financial application software packages includes general ledger and financial reporting, accounts receivable and accounts payable systems. They are a family, Informatics explained, because they were designed to be integrated into a single master system, even though they can be used separately.

URG currently can be used in tandem with the general ledger and financial reporting system; linkages to the other Accounting IV packages are expected in the near future.

URG is based on Score, a file management/reporting system marketed by Programming Methods Co., now a division of Informatics. The module is a simplified version of Score modified to operate on the Accounting IV data bases.

As with all versions of Score, URG is a parameterized nonprocedural system which generates a Cobol source program to accomplish the desired results. URG and the Accounting IV system logic together can run in "under 100K of memory," Informatics said.

The Accounting IV systems and URG operate on IBM, Honeywell and Univac mainframes under a variety of operating environments. The general ledger and financial reporting system is available for $25,000 to $34,000 depending on options selected. URG is separately priced at $3,000.

Informatics is at 21031 Ventura Blvd., Woodland Hills, Calif. 91364.

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Kiviat Graphs and Single-Figure Measures Evolving

By Michael F. Morris

Special to Computerworld

The now widely used Kiviat graph technique is almost through one complete evolutionary cycle. The idea that computer performance evaluation (CPE) information can be quickly understood and communicated by adopting a graphic method used in the medical field was suggested at a 1973 workshop by Philip Kiviat, technical director of the Federal CPE and Simulation Center (Fedsim).

Performance Evaluation

Preliminary work with then-available data led to adoption of a "conventional" Kiviat graph format for plotting any *even* number of performance indicators, half of which show "good" performance as they increase from 0 to 100% and half of which indicate "bad" performance when increasing over this same range.

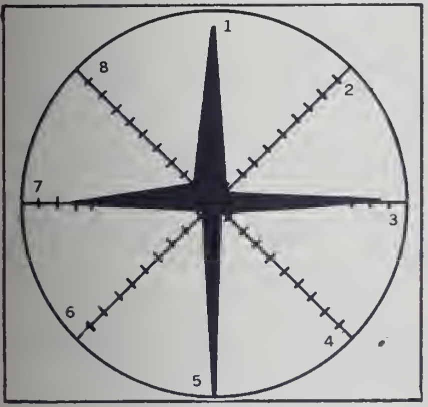

Figure 1

The performance indicators were arranged so "good" and "bad" indicators alternated around the graph, beginning with a "good" indicator on the topmost axis. Using this convention assured that as the performance indicators improved ("good" got larger and "bad" got smaller), the pattern would always approach a star shape, no matter what individual indicators were used.

A *Computerworld* article by Alan Pomerantz and myself [CW, Oct. 3, 1973] reported what we believed was a significant breakthrough in communicating performance changes through Kiviat graphs.

Unfortunately, the tone of our article must have implied the indicators used in our examples were *the* eight important performance parameters. They weren't. They were just eight of the dozen-or-so data points easily available to us for several different IBM systems.

This is the first of two articles dealing with graphic means of describing the results of a computer performance monitoring session. In the second part Morris will discuss the problems with most performance indicators and, in some cases, what the user can do to overcome these problems.

Figure 1 is one of the Kiviat graphs published in our CW article and in a *Performance Evaluation Review* (PER) article by Kiviat and Kenneth Kolence with small differences in the axis arrangement. This figure shows eight indicators from data for a "well-tuned" IBM 360/65. The characteristics star shape was called a "Fedsim star."

The feedback requested in our article came mostly in the form of questions like, "What is WAIT in a Honeywell or Burroughs system?" Some readers asked for interpretations of the shapes witnessed at their own installations.

Questions regarding the meaning of indicators were answered by pointing out that if a particular performance indicator was not both thoroughly understood and meaningful at the questioner's installation, it should not be used. Interpretation of a certain shape could only be made by going beyond the scope and intent of the initial form of Kiviat graphs through in-depth analysis of the installation in question.

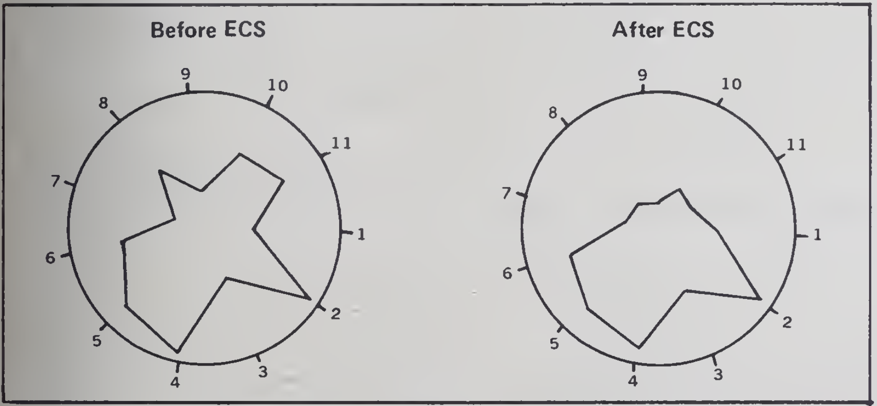

Figure 2

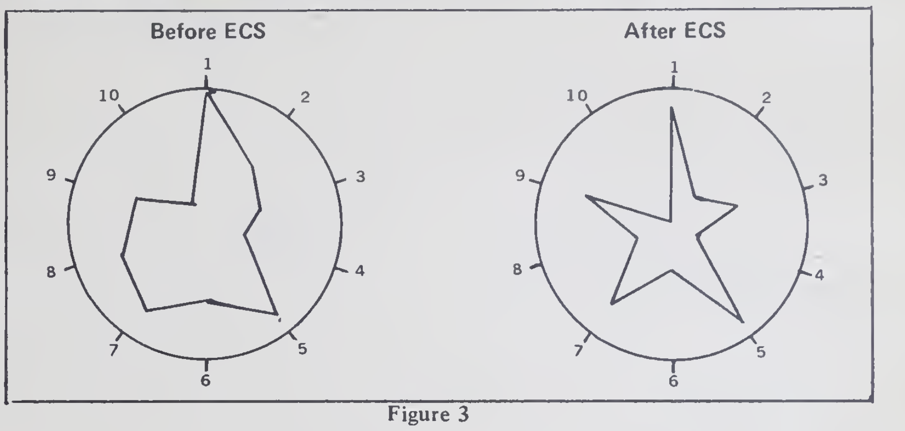

Figure 3

The point was, and is, that Kiviat graphs can be used to spot systems that have a potential for improvement – not that Kiviat graphs themselves will solve performance problems. The most powerful application of Kiviat graphs in their early form was as a communication device to show before and after pictures of a performance improvement project.

Like bar graphs, Gantt charts or any other graphic device, the Kiviat graph is an information display – not an analytical technique.

Other early work in applying Kiviat's suggestion was done at the University of Washington under Prof. Jerre Noe. Noe's implementation used any number of axes without attempting to distinguish the "goodness" or "badness" of any indicator.

Figure 2 shows Kiviat graphs of the University's Control Data Corp. 6400 before and after the addition of extended core storage (ECS). These graphs appeared in a March 1974 PER article by Rowan Snyder, a member of Noe's group.

Snyder's article also included 14 "quantities" or performance indicators collected

(Continued on Page 18)

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'Optimus' Ups DOS Throughput

DANBURY, Conn. – Installations under IBM's DOS and DOS/VS environments continue to have support software offered them by independent vendors. Universal Software, Inc. (USI) has announced the availability of Optimus, a throughput optimizer the vendor claimed improves system performance 15% to 30%.

Residing in the upper 2K of the user's last partition, Optimum analyzes multiprogramming activity at user-specified intervals and dynamically adjusts partition priorities. The adjustments include making I/O-bound jobs higher priority than CPU-bound jobs, resulting in optimal system throughput, according to USI.

With priorities altered "on the fly" by the package, the user is free to run jobs in any partition without concern for partition lockouts or system degradation, the vendor said.

Optimus is said to be installable in minutes and USI emphasized the package does not require modification of the supervisor coding or any other IBM-supplied software.

The package's own code is untouched even if the user wants to change the timing of its samplings, the firm said.

The default option on that timing is 3 sec, a spokesman said, but can go as long as 999 sec if the user desires.

The package is release-independent and can be used with IBM's Power or Power/VS as well as USI's own Asap spooling package. The use of Optimus, however, is not dependent on the concurrent use of a spooler; it "certainly can be used by itself," USI said.

Available in object code only, Optimus can be leased for $75/mo. USI is at 136 White St., Danbury, Conn. 06810.

Kiviat Graph Technique Evolves

(Continued from Page 17)

throughout the project.

Figure 3 shows the same before and after conditions as Figure 2 except that the conventions calling for alternatively "good" and "bad" axes have been followed. Note how much more easily the change toward a star-shaped pattern communicates the performance improvement in Figure 3 than does the shape change seen in Figure 2.

Suggestions for Indicators

There has been some comment that the now widely used indicators as listed in Figure 1 are not individually suited for management decisions. Some have suggested other sets of Kiviat graph axes be developed and publicized to better represent user and management satisfaction with total system performance.

Such indicators might include response times for terminal users or a performance indicator that encompasses all major system resources. One such performance indicator is the Computer Resource Unit (CRU) implemented in Boeing Computer Services' System Accounting and Resource Analysis (Sara) package.

The CRU includes up to 12 variables to define the major system resources for IBM equipment. Clara, a companion product for the CDC line, uses up to 16 variables for the CRU.

As a minimum, the CRU includes the amount of time the processor is busy, the amount of memory used and a factor that represents the overhead or performance degradation due to multiprogramming.

The remaining variables are site-specific for such items as time for classes of immediate access or tape devices, use of terminals by categories or communications devices and so forth. The number of variables included in the CRU for a particular system is based on analysis of that individual system.

The maximum number of variables allowed is based on long experience with systems from the various manufacturers. Should an unusual installation be noted, Sara can be extended to include any number of variables in the CRU calculation for that particular site.

The strength of this approach is that once the CRU is set for the site, a single-number metric is produced for each program, job step or terminal session that is consistent across all applications and is repeatable by application regardless of the variations in the total load on the system. This allows the concept of "capacity management" that is so powerful in other production environments to be applied in the computer environment.

Continuing use of the CRU metric enables production standards to be established by hour, shift, day or, in organizations with central management of several computer installations, on a site-by-site basis.

A final point of interest regarding this CRU approach is that Sara (or its companion products for non-IBM equipment) interfaces with the manufacturer's standard accounting system rather than running as an extension to a particular operating system.

Morris is president of Smart, Inc., a performance evaluation and auditing firm in the Washington, D.C., area.

MVS Users on West Coast Set Group, Plan Meetings

LOS ANGELES – The MVS Users Group of Greater Los Angeles has been established to provide a forum for ideas of interested systems programmers at IBM 370 sites using the later releases of OS/VS2, according to chairwoman Carol C. Powell of the Atlantic Richfield Co.

Meetings are held the third Tuesday of each month and include presentations by vendors of significant products and discussions among the membership, she said.

The next meeting, on Feb. 17, will feature an Amdahl spokesman.

In March, the meeting will focus on MVS tuning and the speaker will be an advisory market support representative from IBM's Systems Support Center.

Powell can be contacted at the Atlantic Richfield Co., Room 332, 645 S. Mariposa Ave., Los Angeles, Calif. 90005.

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IN CALIFORNIA

Vadic is the first modem manufacturer in the US to obtain certification by the California Public Utility Commission for direct connection to the switched telephone network. This means that users of Vadic modems can simply attach them to any public telephone without ordering a permanently installed phone company DAA. Another first for Vadic !

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Magic Trick of the Month

How to connect 15 modems to one computer port with a single Automatic Dialer !

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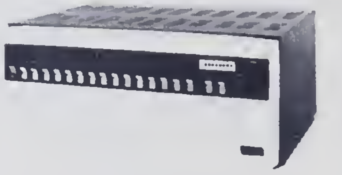

one shared automatic dialer (fully compatible with Bell's 801) in a 7" high chassis. What a tremendous cost savings ! And the system can be expanded to handle up to 60 modems from one RS-232 or RS366 port.

* * *

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Telecommunications and Data Communications User magazines recently sent out surveys to subscribers. One question was ....

"Which of the following companies do you recognize as supplying modems at the rate indicated ?"

Telecommunications Survey

Company	300 bps	1200 bps
AT&T (Bell)	67	68
Vadic	46	63
xxxxxxx	28	14
xxx xxxx	28	21

Data Communications User Survey

AT&T (Bell)	45	48
Vadic	35	47
xxxxxxx	19	15
xxxxxx	16	17

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AT&T Hikes Interstate Data Rates

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – AT&T rate increases, which will affect data communications and private-line users, are scheduled to take effect on Feb. 12. Short-distance, Wats and low-density private-line users will be hardest hit, AT&T figures showed.

The increased rates were filed by AT&T after a Federal Communications Commission (FCC) ruling said the phone company could boost its rate of return on interstate services.

Users of hi/lo; Wats; and both short-haul and long-haul private-line services, including Dataphone Digital Service (DDS), will be affected by the rate hikes. The hi/lo rates were raised even though the FCC issued an order declaring the hi/lo tariff unlawful (see related story).

DDS will be affected by an overall increase of about 3%, according to a Bell spokesman. On a typical multipoint DDS link from Pittsburgh to Chicago to Denver at 2,400 bit/sec, all component charges would be increased.

The intercity digital channel charge will go from the present $2-/channel/mo to $20.60/channel/mo. Intercity mileage will go from 40 cent/mile/mo to 41 cent/mile/mo.

The charge for a Digital Access Line (DAL) Type 1 will go from $65/mo to $66.95/mo; and both the Data Service Unit and multistation arrangement will go from $15/mo to $15.45/mo, AT&T said.

Total costs for the link will go from $856.20/mo to $879.23/mo. Included in the rate increases are DDS installation costs, under which one-time DAL charges will go from $100 to $103 and the Data Service Unit will go from $25 to $25.75, AT&T said.

High-Density Rates

High-density rates will jump to 92 cent/mile/mo compared with the present 89 cent/mile/mo. Channel terminal costs will go from $36.80/mo to $37.90/mo, and station terminal charges will go from $26.30/mo to $27.10/mo, AT&T said.

Low-density rates will rise to $2.71/mile/mo up from the present $2.63/mile/mo. Channel terminal costs will go from $15.75/mo to $16.20/mo, and station terminal costs will go from $26.30/mo to $27.10/mo.

Measured-time Wats rates will increase up to 3% "for most customers" on distances up to 900 miles. There will be no change in rates from 901 to 1,000 miles, and Wats rates will decrease "0.4% to 3.9%" for calls over 1,000 miles, AT&T said.

Full business-day Wats service will increase "0.9% to 17.6%" on calls up to 1,000 miles while calls of longer distance will remain unchanged.

For Series 3002 data users, calls will rise about 3.2%, according to AT&T figures.

A line from New York to Washington, D.C. that now costs $308.65/mo will jump to $318.60/mo. A line from New York to Chicago that now costs $759.88/mo will jump to $785.04/mo.

Short-haul interstate rates (up to 26 miles) will also be affected although interexchange mileage charges will remain at $3.75/mile/mo. Foreign Exchange (FX) lines will go from $11.50/mo to $20/mo while non-FX lines will go from $16.75/mo to $20/mo.

Channel terminal costs will rise from $4.15/mo to $5/mo while FX station costs will go from $11.50/mo to $20/mo, and non-FX station costs will go from $16.50/mo to $20/mo, AT&T said.

Ahead of Bell in User Survey

Special Carriers Win Points for Reliability, Repairs

By John P. Hebert
Of the CW Staff

DELRAN, N.J. – Two specialized common carriers were rated higher than Bell, Western Union or independent telephone companies in the areas of reliability of operation and promptness of repair of communications facilities in a recent user survey.

However, Bell facilities were rated higher than all other facilities for ease of installation – 3.2 on a 4-point scale – according to the Datapro Research Corp. user survey.

"All About Data Communications Facilities" is a 26-page report that describes and analyzes the communications services provided by the telephone companies, other common carriers, satellite channel carriers and privately built facilities.

Survey results were based on 444 user replies which generated a total of 634 responses, the research company said.

Ease of installations of all Bell services were given user ratings of 3.2 except leased wide-band lines (2.9) and dial-up Wats lines (3.1), it added.

Overall, independent public telephone companies received a rating of 2.5 by users; Western Union received a 2.6 rating; satellite channels users rendered a rating of 2.6; and privately built facilities users gave a rating of 3.0, it said.

Independent telephone companies received ratings in this category ranging from 2.4 (leased voice-grade lines) to 3.0 for Wats lines, the report stated.

Western Union's leased voice-grade line and direct-distance dialing (DDD) services were rated the lowest and highest, respectively, by users for ease of installation, the report added.

The specialized carrier facilities provided by MCI Communications Corp. (MCI), Data Transmission Corp. (Datran) and Southern Pacific Communications Corp. (SPCC) were given user ratings for ease of installation of 3.0, 3.0 and 2.2, respectively, it added.

Operational Reliability

In the area of operational reliability, privately built facilities gained the highest overall rating of 3.3, while two specialized carriers, MCI and SPCC, each received weighted average ratings of 3.2, the report said.

Users of Bell facilities rated carrier reliability at 3.1; other telephone companies' and Western Union's carrier reliability was rated at 2.7 and 2.6, respectively, it added.

The most reliable services offered by Bell, according to users, were leased wide-band lines and multiple services usage. The least reliable Bell service was leased telegraph-grade lines with a user rating of 2.7, the report said.

Highest grades given in the category of reliability went to Western Union's dial-up facilities, which gained a flawless rating of 4.0, it added.

Promptness of repairing facilities' problems "continues to be the major headache for many users," the company said.

MCI users rated promptness of repair at 2.9; Bell users' rating was a 2.7; and Western Union and the other telephone companies were both given ratings of 2.1 overall, it said.

The type of facilities used most were voice-grade lines, with 74% of total users' responses; dial-up facilities were utilized by 47% of users surveyed; and leased, wide-band lines had only 11%, the report said.

In the area of transmission speeds, "the old standby 2,000- 2,400 bit/sec speed over voice-grade lines is still predominant," reflected by 57% of users. However, speeds of 4,800- and 9,600 bit/sec are becoming more commonplace and gathered 41% and 21% of user responses, respectively, it added.

Networks with a single computer configuration held 57% of total responses, and multiple computers in a network had 41%, it said.

The average number of lines per user was 16.2, and the average line length was 246.4 miles with an average user network size of 3,748 miles, the report said.

Lines were in use an average of 9.3 hour/day, it added.

The report also includes a large section on carrier's rates and is available for $10 from 1805 Underwood Blvd., Delran, N.J. 08075.

Hi/Lo Tariffs Ruled Unlawful

WASHINGTON, D.C. – The AT&T hi/lo tariffs for private-line users are unlawful and must be changed, the Federal Communications Commission (FCC) ruled here recently.

Filed in November 1973, the hi/lo rates increased charges for private-line users in areas with a low density of users while decreasing costs to users in high-density areas such as major cities.

The hi/lo tariff was designed by AT&T to counter the effects of the specialized carriers which were offering private-line services to data and other users primarily in the areas Bell defined as high density.

The hi/lo tariff is unjustified, and the phone company should file an alternative rate scheme within 90 days or about mid-April, the FCC said.

AT&T's "failure to submit sufficient evidence to justify its rates was fatal to its case" and, as a result, the hi/lo tariffs were found to be unlawful, the commission said.

Although AT&T had been required to keep separate accounts for all charges increased as a result of the tariff, the FCC said "it would not be in the public interest to grant any refunds" to users "since few customers incurred significant increases as a result of the hi/lo filing."

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Terminal Transactions

For Financial Firm

Switch to Nationwide Net Revolutionizes Processing

By John P. Hebert
Of the CW Staff

NEW YORK – A financial services company based here said it has undergone "a complete revolution" in processing financial information with the installation of a nationwide data communications system.

CIT Financial Services Corp. (CITFS) had a manual system at the branch office level in 1972 when it decided to begin development work on the Citation system, according to Robert P. Parsons, Jr., vice-president of systems operations.

The conversion of CITFS' almost 800 nationwide branch offices to the Citation system started in November 1974 and was completed on schedule recently, Parsons said.

The communications portion of the system relies on over 900 hard-copy GTE/Information Systems (GTE/IS) 55/44 Model 2 terminals with integrated electronics built for the Citation system, Parsons said.

The terminals are located at CITFS branch offices, 13 regional offices, an accounting control center in Oklahoma City, Okla., and company headquarters here.

Financial services data is sent through United Data Services Co., Inc. modems at 1,200 bit/sec from the terminals to 13 Honeywell, Inc. 716 data concentrators over private lines, Parsons said.

The concentrators transmit the information through unconditioned, dedicated private lines at 4,800 bit/sec to an IBM front-end terminal interface for duplex IBM 370/195s in Miami, Fla., operated by Eastern Air Lines, he explained.

The system is capable of storing 1.2 billion characters of information, uses about 1,600 programs and performs more than 200 different functions, a CITFS spokesman said.

The programs range from completion of loan documentation and automatic updating and billing of accounts to compilation of detailed management control reports formerly prepared manually at the company's branch offices, regional centers and headquarters, he added.

The network also has message-switching capabilities between terminals at each office location, including the regional and headquarters offices, Parsons said.

An organizational hierarchy permits broadcast communications of a message from headquarters to the regional offices or branches, he added.

The total response time of most inquiries to the Miami system is 3 sec to 5 sec, Parsons said, adding this was the estimated response time when CITFS began system development.

"One of the major accomplishments in the planning, development and installation of Citation is that target dates have been met and both personnel and system performance have either matched or exceeded expectations in all phases," according to Todd G. Cole, CITFS president.

There is a 20% to 25% increase in productivity now that the system is in operation, Parsons said.

By relieving branch office personnel of a substantial portion of loan documentation and by eliminating manual preparation of branch reports, the system contributes to the efficiency of branch office operations, Cole explained.

In addition, it has improved the effectiveness of the depository transfer system CIT employs to maximize cash-flow utilization and, through its communications capability, has reduced telephone expenses, he added.

CITFS customers benefit from the system through simpler loan application procedures and faster service. In addition, a customer now can make a payment or get information on an account at any CITFS office, rather than just the office where the loan was made, he said.

There are also cost savings. The system, Parsons emphasized, makes a great deal of money.

Additionally, the overall reduction in consumer communications is "more than sufficient to pay the costs of the entire communications network," Parsons said.

CITFS is also considering network expansion. "This is just step Number one. CIT, the parent company, owns a number of companies and this system will be expanded to include those other companies," he said.

The company plans to lash together a multiplicity of networks, all of which would find a foundation on the Citation system, he concluded.

Five-Year Lease Plan Introduced by IBM

WHITE PLAINS, N.Y. – IBM has instituted a five-year lease plan for certain units that are part of its financial, retail, and supermarket terminal systems.

Called the Alternative Term Plan (ATP), the lease includes purchase option accruals up to 50% of the purchase price and unlimited one-year extensions with no additional use (overtime) charges.

The ATP is the longest lease plan available from IBM, which also offers the Term Lease Plan (48 months) on CPUs and the Extended Term Plan (24 months) on peripheral units.

Equipment covered under the ATP includes the 3603 terminal attachment unit, the 3606 financial services terminal, the 3608 printing financial services terminal, the 3653 retail point-of-sale terminal, the 3663 supermarket terminal and the 3666 supermarket scanner.

The 3603 is $23/mo under ATP of $750 purchase; the 3606 is $26/mo or $800; the 3608 is $59/mo or $1,900; the 3653 is $124/mo or $3,790; the 3663 Model 1 is $193/mo or $6,150; the 3663 Model 2 is $97/mo or $2,860; and the 3666 is $163/mo or $4,240, IBM said.

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The new "Silent 700*" Model 745 Portable Data Terminal from Texas Instruments is the new lightweight champion. It weighs only 13 pounds...*half* as much as the currently most popular portable...our own Model 735.

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Terminal Transactions

GIC POS Devices Offer Unitote/Regitel Compatibility

NEW YORK – General Instrument Corp. (GIC) has rolled out a communications-oriented, programmable series of point-of-sale (POS) terminals which, it said, is compatible with its Unitote/Regitel retail store systems.

The Series 400 includes two models – the 420, a computer-controlled terminal, and the Model 430.

The 430 is a stand-alone, intelligent terminal compatible with Unitote Series 302 retail systems. It incorporates the same keyboard and display characteristics as the Series 302 systems – a 10-key pad, 34 function keys and a 14-character numeric display for pricing information, a GIC spokesman said.

The terminal includes "action guidelights" which lead an operator through a customer transaction by sequential lighting of the function keys, he said.

Up to 200 Model 430 terminals can be used with a Series 302 system; 10 terminals can be wired onto one channel which is hard-wired to the in-store minicomputer controller, he said.

Transmission speed per channel is 5,250 bit/sec; 10 terminals can operate on one channel with an effective speed of 525 bit/sec, he added.

Because the Model 430 is an intelligent terminal, it can operate independently of the minicomputer controller if the controller fails, GIC said.

Nonintelligent Terminal

The Model 420, nonintelligent terminal compatible with Regitel Model II systems, incorporates the same keyboard and display characteristics of Model II systems terminals, including a 10-key pad and 13 function keys, the spokesman said.

This terminal also has an operator prompter display running under software control of dual in-store minicomputers, he said.

The effective speed of the Model 420 is 600 bit/sec through a "home run wiring approach" communications link to in-store multiplexers, the spokesman said.

The Series 400 models have a 40-character alphanumeric printing capability on the sales receipt and an optional, remote numeric display for customer viewing of the transaction, he said.

The journal/receipt printer is driven separately under software control and accommodates one- or two-part detail paper for the audit roll, the company said.

Both the salescheck and the journal/receipt printer operate independently to selectively print information required for the audit trail on the journal/receipt printer, it said.

The Series 400 was designed to support an OCR-A encoding standard and OCR-A wand readers can be attached to the terminals, the company said.

In addition, the terminals can accommodate other types of wand readers, including print/punch, bar code or magnetic types, it added.

The terminals allow the automation of delivery fees, service charges, minimum-deposit functions and pricing information through a price lookup feature, it said.

The Model 420 is priced at $2,920; the Model 430 costs $3,650 depending upon options desired, the spokesman said. Deliveries are scheduled for the first quarter from 1775 Broadway, New York, N.Y. 10019.

RCA Service Leasing GE Terminet 30 KSR

CAMDEN, N.J. – The General Electric (GE) Terminet 30 keyboard send/receive (KSR) teleprinter is available for leasing from RCA Service Co.

The matrix impact printer provides terminal facilities for data transmission in attended or unattended mode at 30 char./sec, RCA said.

Printer features include vertical format unit (for form-out and vertical tabulation), telephone coupler hookup capability, answerback, adjustable pinfeed – 4 in. to 9-1/2 in. – and ribbon cartridge.

The terminal prints 10 char./sec on an 80-character line with 6 vertical line/in. operating on an eight-level Ascii code, RCA said.

A telephone acoustic coupler or EIA interface can be supplied if desired.

The rental price is $90/mo, including maintenance, RCA said from its Cherry Hill Offices, Camden, N.J. 08101.

Adds Designs Consul 520, Low-Cost Version of 580

HAUPPAUGE, N.Y. – Applied Digital Data Systems, Inc. (Adds) has introduced what it said is a low-cost version of its Consul 580 CRT.

The Consul 520 was designed for the CRT user whose inquiry/response application does not require hard-copy output, the company said.

The 520 allows the CPU to X-Y address the terminal cursor, perform carriage return and line-feed operations, erase the screen, lock and unlock the keyboard and sound an audible alarm to the operator, Adds said.

The terminal screen has 1,920 character positions arranged in 24 lines with 80 char./line. Five transmission rates are available for communications through either EIA RS-232 or 20 Ma current-loop interfaces, the company said.

The interactive CRT terminal is priced at $1,595. Deliveries are scheduled to begin in April from 100 Marcus Blvd., Hauppauge, N.Y. 11787.

Intertran-2 Cost Reduced

EL SEGUNDO, Calif. – Computer Transmission Corp. (Tran) has reduced the price on its recently introduced Intertran-2, a synchronous digital data set, according to the company.

The reduced price is $550, Tran said from 2352 Utah Ave., El Segundo, Calif. 90245.

Correction

The Panasonic Model S terminal [CW, Jan. 26] is a badge reader with data transmission capabilities, not a CRT.

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The 745 portable interfaces via a built-in acoustic coupler or auxiliary EIA port, whereas the KSR interfaces via TTY, EIA or integral modem. Both feature either half- or full-duplex operating modes, standard parity options and an ANSI standard keyboard with an embedded numeric key pad.

At the heart of each model is a TI microprocessor...the key element contributing to its compactness, high reliability and superior performance capabilities.

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For more information, contact your nearest TI office. Or, write Texas Instruments Incorporated, P.O. Box 1444, M/S 784, Houston, Texas 77001. Or, call Data Terminal Marketing at (713) 494-5115, extension 2126.

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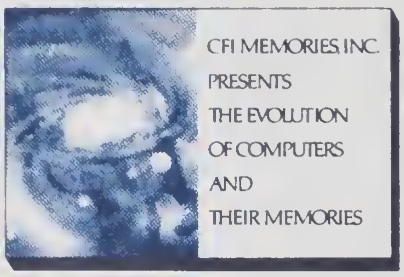

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Programmer Time Hidden Cost?

COM Often Not Compatible With Report Generators

By William B. Simmons
Special to Computerworld

At first glance, computer output microfilm (COM) may appear to solve the output problems of many DP centers. COM users, however, may find themselves devoting considerably more programmer hours to coding output formats than they did with hard-copy printers.

The problem is that the output formatting software the COM vendor supplies is often not compatible with the problem-oriented report generator packages many DP shops use today.

This is especially true for "dumb" COM units with minimal logic circuitry. This kind of COM recorder is, in effect, a slave to the tape the user hangs on it. (I have had less experience with "smart" COM recorders, so I can't really judge how much of an advantage they offer.)

The operator of the "dumb" COM unit can set some parameters, but for the most part, everything the unit is to do must be coded on the tape. Every film advance,

Analysis

every title frame, every index entry must be on the tape before it reaches the COM unit.

Double-Priced Advantages

The "dumb" COM recorders cost less and provide what vendors like to call "ease of operation," but these advantages have a double price. The mainframe has to perform additional processing and the programmer is forced into extremely detailed logic coding.

Of course, the vendor supplies software to handle the most onerous formatting tasks. The drawback is that this software must be CALLed in place of doing output directly.

This neatly rules out every report formatting package that I have ever seen. They all seem to be geared to producing "ordinary" fixed-length, blocked records and incorporate their own I/O logic. And none of them supports an extended carriage control set.

So the "dumb" COM user is back to coding all his report formatting routines in detail.

There may well be situations in which the balance of economic factors is in favor of "dumb" units. I just have a hard time believing it.

When there is a major trend to take front-end processing off the mainframe with intelligent data entry systems, it is difficult to believe opposite arguments apply to the output end.

When constant strides are being made in increasing programmer productivity, it is hard to believe we cannot get away from detailed report coding.

If a COM unit is to escape all these difficulties, above, it should:

- Be capable of rudimentary label processing, at least enough to access record format data and verify volume sequence.
- Be able to deblock print lines. Camera movement and I/O should be overlapped.
- Be able to select and print, on multiple passes, reports that have been formatted in parallel onto the same tape.

Ideally, a COM unit should also be able to generate any additional information peculiar to a particular microform, such as titles and indexes for microfiche and bar codes for microfilm. This is more difficult but would create maximum flexibility.

Simmons is an independent DP consultant in Montreal, Canada.

Let CW Share Hardware Triumphs

A special report on "Stretching Your Hardware Dollar" coming up in *Computerworld*'s March 29 issue will focus on ways users can get the mainframe or peripheral capacity they need for as little money as possible.

If you believe your installation has done something unique or cost-effective in this area, CW would like to hear about it.

Just write us a long letter (three or four double-spaced, typed pages) and explain what you had before, what you have now and why, the advantages of the new system or peripheral and just how effective the change has been from a cost or capability standpoint.

Write to us by the end of the month and our team of editors will take it from there. If you're not sure of just how interesting your story is, send a short note to Patrick Ward.

CW is at 797 Washington St., Newton, Mass. 02160.

Sycor Adds Printer Series for 440 Line

ANN ARBOR, Mich. – Sycor, Inc. has brought out a series of microprocessor-controlled matrix printers for use with its 440 clustered terminal processing system.

Available in 60-, 120- and 180 char./sec models, the printers in the 4600 series print the standard set of 64 Ascii characters in a 7 by 7 dot matrix.

Because of the range of capabilities they offer, the 4600 series printers can provide more throughput than conventional printers of the same rated speed, Sycor said.

The printers feature a 5K microprocessor to control print-head needle timing, character registration and other functions, Sycor said.

The microprocessor allows the printer to move its print head to the beginning or end of the next print line, whichever is closer, and print that line from left to right or right to left. This minimizes the time between completion of one print line and the beginning of the next, Sycor said.

The printer also offers automatic vertical slewing whenever it encounters two or more line feeds, according to the company.

A horizontal slew option that performs high-speed slewing over blank fields can further enhance throughput, a spokesman added.

In most print applications, the Sycor 60 char./sec printer can equal the throughput of conventional 80 char./sec models and the 120 char./sec model can outperform conventional 165 char./sec printers in all applications, the vendor claimed.

With the printer's 12-key function pad, users can set margin widths, forms length, vertical and horizontal tab positions and execute commands such as "top of form" as well as have dynamic forms alignment for preprinted forms.

The microprocessor-driven system also allows the generation of two diagnostic test patterns (continuous printout of the character set on 132-character lines or short lines of 16 characters with alternating Xs and Os for forms alignment) which can be initiated from the function keys.

The 60 char./sec Model 4606 printer costs $155/mo on a one-year lease and $133/mo on a three-year lease. The purchase price is $5,600.

The 120 char./sec Model 4612 printer costs $218/mo on a one-year lease and $190/mo on a three-year lease. Its purchase price is $6,600.

The 180 char./sec Model 4618 printer costs $276/mo on a one-year lease and $242/mo on a three-year lease. The purchase price is $8,620.

Sycor is at 100 Phoenix Drive, Ann Arbor, Mich. 48104.

NCR Modular System for Criminal Justice Users

DAYTON, Ohio – NCR Corp.'s On-Line Criminal Justice System is a dedicated hardware and software package that can grow modularly from a 32K (word) minicomputer-based system to one incorporating both the mini and a 128K Century 101 CPU, NCR said.

A city's police department, for example, can run the Computer-Assisted Dispatching module on the minimum system consisting of an NCR 6599 minicomputer with disk, CRT terminals and remote printers.

Other application modules, however, require interfacing the minicomputer with the Century 101, which provides an integrated data base, NCR said.

The On-Line Law Enforcement Information module allows users at terminals to key in data from field investigations, warrants, stolen property reports and offense reports. This information can later be used in operational and administrative reports.

Users can withdraw specific information or search a file when only partial information is available. They can also communicate with other agencies and interface with state and National Crime Information Center networks, NCR said.

The Booking and Prison Management module handles all booking information and provides access to the data for updating records and for prison management, NCR said.

The Courts Data System module, used in conjunction with the booking system, provides courts and prosecutors with access to an integrated incident and subject data base, the company said.

The minimal On-Line Criminal Justice System with the Computer-Assisted Dispatching module, minicomputer, disk unit, CRTs and remote printers costs from $170,000 to $190,000.

The full-scale system with the two computers, four disks, CRTs and all the software modules costs from $550,000 to $650,000 from the firm in Dayton, Ohio 45479.

Why stick with a single source serial printer?

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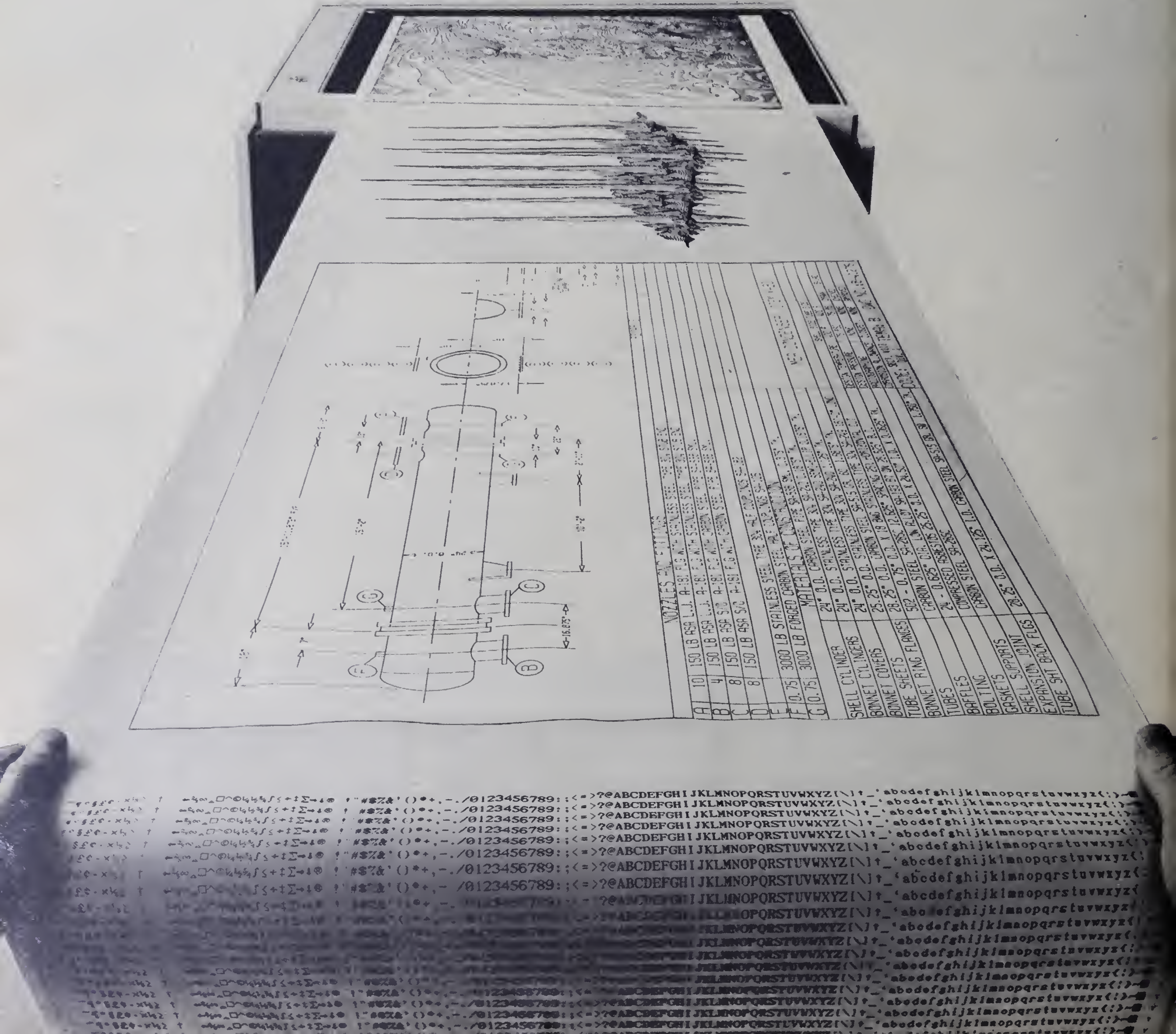

Prospective Hardware Buyers Must Look Beyond Specs

By Raymond L. Little

Special to Computerworld

When selecting hardware, users should not put too much weight on specifications alone. It is too easy for vendors to confuse the issue with meaningless data on bits and bytes and feeds and speeds.

The most important thing for a prospective user to know is whether the machine can do his job at a reasonable cost. The user can decide this best by seeing his kind of work running on the same type of machine in another user's shop.

The prospective user should be sure to pump users to whom he has been referred for information on the bad as well as the good side of their machine.

It does happen, however, that hardware comparisons must be made. The objective then is to put the claims of the various vendors on an equal footing. Let's consider the proposals of Vendor A and Vendor B. Summarized from a hardware point of view they look like this:

	Vendor A Proposal	Vendor B Proposal
Memory	12K	16K
Disk Storage	5M bytes (1 fixed, 1 removable) 2.5M bytes (1 removable)	10M bytes (1 removable)
Printer	200 line/min	250 line/min
Card Reader	200 card/min (96-column cards)	200 card/min (80-column cards)
Card Punch	150 card/min	none
Language	RPG	VSL (Vendor's Specia Language)

At first glance, Vendor B looks like a walking-away favorite, but let's take a closer look at the hardware specifications.

While B's machine has 4K more than A's, its supervisor requires about 2K more memory.

The automatic overlays (i.e., placing segments of programs that would normally be too large on disk until requested) of A's machine more than compensate for the remaining numerical memory advantage.

Vendor B's machine has just one spindle with a removable disk pack. While A's 7.5M bytes is less than B's 10M bytes of disk capacity, B's machine won't pack numerical data and A's will.

More importantly, Vendor A offers two separate disks. His user can copy from the removable to the fixed pack and then back up that information on a second removable pack.

Vendor B doesn't provide that type of disk file backup capability. If B's customer adds additional disk drives to his configuration, his system will require the system software to reside on all packs loaded on the system.

This means that roughly 13% of every disk pack will be reserved for the system.

While B's print line is wavy, it is legible. Assuming both printers will make a sufficient number of copies, the extra 50 line/min can be an advantage.

Comparing printers becomes much more difficult when one of the printers is a character printer. Line printers are generally faster, but character printers are generally cheaper.

The 96-column cards offer space for 20% more data on each card. Equipment to handle the smaller 96-column cards, including keypunches, is cheaper. The 80-column cards also cost about 75% more per thousand.

Some vendors that aren't strong in the card punch area have been telling customers that cards are old-fashioned and about to fade out of existence. For many users, however, they can be a source of significant savings as turnaround documents.

Language Problem

Never heard of VSL? Well, don't worry, Vendor B will help someone from the customer's company learn the language.

However, if that person leaves the user's employ, the user will have trouble finding someone on the market with experience in VSL.

Languages peculiar to a particular vendor can be dangerous. Support may not be forthcoming to support new devices, and customers may also find themselves stuck with that vendor forever unless they wish to go through a costly conversion.

Overall, vendor A would appear to have a superior machine, judging from a hardware point of view.

Now suppose Vendor A's service was in the next town – 80 miles away – and Vendor B had a comparable machine installed in town.

This other user's machine could provide assistance during installation and backup later in case something went wrong.

Suppose only Vendor B had an operational software package whereby the user could have his applications up and running in a matter of weeks instead of having to program everything from scratch and forego an earlier payback.

The point is, of course, that users must look much further than hardware specifications alone.

Little is a staff systems analyst with Champion Sparkplug Co.

Microfilm Seminar Set for Five Cities

NEW YORK – "Developing Microfilm Systems" is the title of a two and a half day seminar the American Management Association (AMA) will offer in five cities this spring.

The seminar will consider basic concepts, standards, indexing and legality of microfilm, the AMA said, and will include coverage of the advantages and limitations of computer output microfilm (COM), as well as discussions of COM equipment, operating procedures, quality control and other topics.

From March to May

The seminar will be held in the AMA Management Center in Chicago on March 29-31; at the Sheraton-Ritz Hotel in Minneapolis on April 5-7; at AMA headquarters in New York City on April 20-22; and at the Huntington-Sheraton Hotel in Pasadena, Calif., on May 24-26.

The seminar costs $430 for AMA members and $495 for nonmembers. Further information is available from the AMA at the American Management Associations Building, 135 W. 50th St., New York, N.Y. 10020.

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A list of current seminars is given below. To register for any seminar, or if you'd like more information, just check the appropriate box and send in the coupon.

How to Increase Programming Productivity

A 2-day seminar for technical managers on new analysis, design, and implementation methods and how to manage them better. Led by John W. Brackett, PhD, Vice President of SofTech, Inc., and Prof. Clement L. McGowan of Brown University. Fee: $300, including continental breakfasts, luncheons, and all course materials. $250 for additional registrants from the same company. Schedule:

Chicago	Hyatt Regency O'Hare	March 8-9
Wash., D.C.	Stouffer's National Center Inn	April 6-7
Atlanta	Hyatt Regency	May 3-4
St. Louis	Mariott at Lambert Airport	May 24-25

Legal Tools for Computer Contracting and Protection

A 2-1/2 day seminar that shows you how to increase your advantage in dealing with vendors that supply your installation. Includes discussion and review of your own contracts. Led by Roy N. Freed, the nationally known lawyer, author and educator in the field of computer law. Fees: $325, including continental breakfasts, luncheons and all course materials. $275 for additional registrants from the same company. Schedule:

Orlando, Fla.	Sheraton Towers	Feb. 18-20
Seattle	Airport Hilton	May 19-21
Chicago	Hyatt Regency O'Hare	May 5-7
New York	Summit Hotel	Jun. 23-25

Performance Evaluation and Improvement

A 2-day seminar on measurement techniques that are designed to save your installation money. Led by Saul Stimler, author of *Data Processing Systems: Their performance, evaluation, measurement and improvement.* Fees: $250 per registrant, including continental breakfasts, luncheons, and all course materials. Schedule:

New York	N.Y. Hilton	May 10-11
Chicago	Hyatt Regency O'Hare	May 17-18
Wash., D.C.	Stouffer's National Center Inn	May 24-25

Data Communications Course #1010 - Practical Data Communications Systems & Concepts

A 2-day seminar on the newest advances in data communications, including SDLC, DDS, new tariffs, equipment characteristics, and the impact of satellite carriers. Led by Dr. Dixon Doll, Teleprocessing consultant. Fees: $350, including continental breakfasts, luncheons, and workbook and reference materials. $300 for additional registrants from the same company. Schedule:

Chicago	Hyatt Regency O'Hare	Mar. 15-16

Data Communications Course #1020 - Advanced Teleprocessing Systems & Concepts

A follow-up to course #1010, this 3-day seminar emphasizes techniques that minimize operating costs in commercial data communications networks. Also led by Dr. Dixon Doll. Fees: $450, including continental breakfasts, luncheons, and an extensive set of customized course materials. $400 for additional registrants from the same company. Schedule:

New York	Essex House	Feb. 23-25

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DAY I – MONDAY, FEBRUARY 16

*9:30 - 12:30	*Applications; Manufacturing*
*9:30 - 12:30	*Applications; Service Industries*
*9:30 - 12:30	*Networks; Networking Revisited— Effect of New Facilities and Procedures*
*9:30 - 12:30	*Forum; Network Diagnostics*
*9:30 - 12:30	*Applications; Insurance*
10:00 - 11:30	*Workshop; Network Planning & Budgeting*
10:30 - 12:00	*Workshop; CPU's and DataComm Software*
*2:30 - 5:00	*Basics; System Planning & Administration*
*2:45 - 5:30	*Networks; Network Optimizing Techniques*
R3:00 - 4:30	*Workshop; Network Planning & Budgeting*
R3:00 - 4:30	*Workshop; CPU's and DataComm Software*
3:00 - 4:30	*Workshop; Communications Processors and Multiplexers*

** Signifies sessions with 30 minute break for reviewing exhibits and for refreshments*
R Signifies Repeat Sessions

DAY II – TUESDAY, FEBRUARY 17

R8:30 - 10:00	*Workshop; Communications Processors & Multiplexers*
*8:30 - 12:00	*Networks; Optimizing International Networks*
8:30 - 12:00	*Forum; Bringing DP Power Closer to the User — Role of Terminals*
*8:45 - 12:00	*Applications; Government*
*8:45 - 12:00	*Applications; Banking & Securities*
*8:45 - 12:00	*Applications; Energy Industries*
*9:00 - 11:30	*Basics; Data Transmission Services & Modems*
10:00 - 11:30	*Workshop; Network Implementation*
10:30 - 12:30	*Workshop; Remote-Batch and Data-Entry Terminals*
*2:30 - 5:00	*Basics; Data Terminals*
*2:45 - 5:30	*Networks; Minis in Distributed Networks*
*2:45 - 5:30	*Forum; Bringing DP Power Closer to the User — Role of Small Business Computers*
R3:00 - 4:30	*Workshop; Remote-Batch and Data-Entry Terminals*
3:00 - 4:30	*Workshop; Interactive CRT and Hard-Copy Terminals*
R3:00 - 4:30	*Workshop; Network Implementation*

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DAY III – WEDNESDAY, FEBRUARY 18

R8:30 - 10:00	*Workshop; Interactive CRT & Hard-Copy Terminals*
8:30 - 10:00	*Workshop; Modems & Couplers*
*8:45 - 12:00	*Applications; Hospitals and Health Care*
*8:45 - 12:00	*Applications; Computer Services*
*8:45 - 12:00	*Applications; Retailing/Wholesaling & Distribution*
*8:45 - 12:00	*Networks; Optimizing Data Entry in Distributed Networks*
*8:45 - 12:00	*Forum; Rap Session on Distributed Networks*
*9:00 - 11:30	*Basics; Data Processors & Software*
10:00 - 11:30	*Workshop; Network Management*
R10:30 - 12:00	*Workshop; Modems & Couplers*
10:30 - 12:00	*Workshop; Data Transmission Services*
1:30 - 3:30	*Networks; Role of Remote-Batch Terminals in Distributed Networks*
R2:00 - 3:30	*Workshop; Data Transmission Services*
R2:00 - 3:30	*Workshop; Network Management*

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Helps Narrow 'Learning Gap'

CAI Scores High With Students, Boosts Achievement

WHITTIER, Calif. – Achievement levels of students in the Los Nietos School District here increased sharply after the district launched a computer-aided instruction (CAI) program, according to Martin Montano, district superintendent.

"The students enjoy this method of learning and eagerly look forward to their learning sessions," he added.

Los Nietos installed a 192K IBM 370/115 about one year ago. The Federal government under the Emergency School Aid Act for districts in the process of integrating, pays for the approximately $12,000/mo rental on the system.

The system supports 42 computer-aided instruction (CAI) terminals during the day and handles some administrative DP at night, according to Dr. Nelson D. Crandall, district program director.

The system also offers a computerized vocational information program, Crandall added.

Los Nietos' three main CAI programs, reading, language arts and mathematics, were originally developed by Computer Curriculum Corp. of Palo Alto, Calif.; the Poughkeepsie, N.Y., public schools; and the St. Louis, Mo. public schools, respectively.

The Los Nietos School District operates five elementary schools serving 2,500 students, about 81% of whom are of Hispanic origin.

Addresses Problems

"Most of the teaching methods in this country are geared to the learning style of the middle-class majority and often can lead to frustration, feelings of incompetence and alienation for many students in our district," Montano said.

"Yet attempts to give such students easier subjects – to make success easier – does not fool the child. It even tends to reinforce his negative self-image when he discovers an 'easy' program leaves him with a background inadequate for high school, college or the job market.

"But with CAI, we have addressed some of the problems and, at the same time, helped improve the attitudes of many of our students," he said.

"For example, the computer reacts to all children in the same fashion and gives them instant feedback on their performance. The child also can see a direct relationship between his efforts and the results.

"These benefits help narrow the 'learning gap' between our students and those in districts serving primarily the middle-class majority."

Each student types his initials and birth date as he begins his computer-aided instruction period. The system identifies the student from this "code," activates his file and responds by printing the student's full name.

Maintains Record

Based on a cumulative record the computer maintains of each student's progress in each learning area, the system poses questions or problems appropriate to that student's learning stage.

If the student is learning addition, the computer will pick up where the student finished the last work session. As the session proceeds, the computer prints increasingly difficult work problems.

So long as the student continues to type in correct answers, the problems get tougher. When the student starts getting wrong answers or is unable to solve the problems in the allotted time, the system automatically "backs up" to give the student practice at easier problems.

"Fast learners can progress rapidly and remain challenged, while slower students can spend more time mastering each phase of their work," Crandall said.

"We've discovered that slower students have made significant progress because of this feature," he said.

The system selects a drill level that helps each student achieve a "score" of at least 70%, but never more than 80%.

"This guarantees that the slower students will be successful and keeps them encouraged; at the same time, it ensures that the brighter students remain challenged," Crandall said.

At the conclusion of each work session, the computer prints the student's score.

Instant Reward

"This serves as an immediate 'reward' and lets the student see – instantly – the relationship between his efforts and the results," Crandall said.

While there is a novelty to working with a terminal, the greater part of the student's enjoyment comes from the sense of independence it provides," Crandall said.

"Unlike a classroom situation, where the teacher runs the show, the student feels very much in charge of things when he works with the computer," he added.

Teachers find the program frees them from the drudgery of drill work and gives them more time to teach concepts and processes that are then reinforced by the computer," Crandall said.

"The computer does not replace the teacher, but augments his work."

Because the system maintains a file on each student, teachers can obtain data at any time on each student's progress as well as composite achievement profiles for entire classes.

The computer-aided instruction program is used mainly for students in fifth through eighth grades, but is made available to some students in lower grades and to certain high school students.

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Report Says CPUs May Cost $20

Peripherals of Future to Lower Total Systems Costs

By Esther Surden
Of the CW Staff

WALLINGFORD, Conn. – Less costly peripherals will reduce the price of what is now a $25,000 mini to $10,000 in the not-too-distant future, according to a report by Northeast Services, Inc., a marketing and consulting firm here.

Northeast predicted CPU prices will continue to decrease to the $20 and $30 level of present microcomputers and that a 200-nsec cycle time will be available in the next two to five years.

Memories will cost less than $200 for 4K 16-bit words and Direct Memory Access (DMA)-type options will drop in cost from $200 to $400 to $50 or $60.

CPU pricing has traditionally accounted for less than 10% of total systems costs, according to the study. Since these prices have been reduced over the last four years, the remaining 90% of system costs should be lowered as well, Northeast said.

Although memory has shown remarkable price decreases over the last four years, as price per bit decreased, memory requirements increased, it said.

Chassis and power supply prices have remained stable because, as technical advances have taken place, component costs have increased.

The cost of DMA, power fail, teletypewriter interface, autoload and real-time clock options have decreased, but only because manufacturers are using main memory for what had previously required hard-wired circuits.

Sixteen-bit digital I/O items have decreased in price only when the competition from peripherals systems houses or build/buy decisions have forced competitive pricing, the report said.

Paper tape reader/punch units have been stable at a cost of 18% to 22% of the total system.

Moving-head disk systems' only improvement has been increased storage capacities. Storage accounts for 40% to 50% of the system costs, the report said.

Printers, which can account for 17% to 20% of the cost of a typical system, have remained constant over the last four years.

Some Progress Made

Some progress in lowering peripheral costs has come from IBM and 3M Co. with the floppy disk and the 3M cartridge, Northeast continued.

Prices for both units are approximately $700 for drives with read/write and motor control electronics.

More progress is necessary to replace costly paper tape readers, random-access memory (RAM), printers and systems interfaces with units more appropriate to the cost of the CPU they serve, Northeast said.

Paper tape, for example, has been used for low-cost serial input/output storage. Mini/Micro users have used paper tape for program loaders and data input/output.

Paper tape reader/punch units cost approximately $5,000, with 300-character input and 75-character output and no error correcting.

To replace the paper tape unit, Northeast suggested a magnetic-tape reader/writer along the lines of Mohawk Data Sciences' key-to-tape system.

The innovation that came with the Mohawk unit, Northeast said, was the technology that used magnetic tape strips instead of reels of tape.

The study estimated that, with a conventional paper-tape reader, 4K words of tape are usually read at a time, then loaded and checked. Each 4K takes approximately 30 seconds on a 300 char./sec reader and more than 15 minutes on a 10 char./sec reader.

Northeast's magnetic-strip reader/writer of the future would be single-track full width with read/write, 4.8 in./sec tape speed; 200 bit/in. recording density; 9,600 bit/sec transfer rate with RS-232; and variable-length inputs.

Less than 40 inches would be taken up by 4K words, making load time less than 10 seconds.

The hypothetical unit would cost an estimated $300 and outperform paper-tape equipment at 1/20 of the cost, the report said.

Cartridge disk used as RAM is another expensive peripheral (about $13,000) Northeast believes can be replaced with a more suitable mini/micro option.

The technology that would allow the creation of such a storage unit was developed by IBM, Northeast said.

Its concept was to place the data on small rolls of tape in off-line storage. When the data was requested, a disk would choose the tape to be read to it, which in turn would be transmitted to the CPU.

Keeping the tape accessible to the disk and keeping the disk on-line to the mini would provide many cost-saving benefits, Northeast said.

The future storage system would have two parts. One would be an IBM-compatible RAM unit with 11 msec/track access time and 167 msec/rev latency time. Transfer rate would be 250k Hz.

The second part would consist of a serial access unit with 3.2M bytes of storage. Read/write time would be 30 in./sec and transfer rate would be 48K Hz.

The entire cost would be approximately $4,000 with read/write, control and complete interface, Northeast estimated.

(Continued on Page 30)

HP 9825A Calculator Has Mini Features

By a CW Staff Writer

PALO ALTO, Calif. – The HP 9825A from Hewlett-Packard Co. (HP) is a desktop programmable calculator with minicomputer-like features, according to the vendor.

The unit was designed primarily for engineering, research and statistical use and can be used to control instrument systems and for pilot process-control applications, remote data collection and production control.

A "live" keyboard allows users to change program variables, perform complex calculations, call subroutines and record and list programs while the calculator is performing other operations, HP said.

Other 9825A features include two-level priority interrupt, direct memory access with input speeds of up to 400K 16-bit word/sec, bidirectional tape drive, multidimensional arrays, automatic memory record and load, extended internal calculation range and optional plug-in read-only memories, according to the firm.

The calculator uses a programming language called HPL that handles subroutine nesting and flags, HP said.

Twelve functions keys aid in program writing and in peripheral and instrument control, according to the firm. The 9825A's interrupt ability allows the calculator to act as a controller for several instruments or peripherals which require attention at unpredictable rates or times, a spokesman said.

Alphanumeric Readout

A 32-character LED display and built-in 16-character thermal printer provide upper- and lower-case alphanumeric readout. The tape cartridge used on the calculator is the same one used on the firm's earlier 9815 programmable calculator, the spokesman said.

The 9825A can accommodate three optional interface cards and will work with many standard HP peripherals, including the 9871A impact printer/plotter, plotters, paper tape punches and paper tape readers.

Also introduced at the same time as the 9825A was the 9866B thermal line printer that can be used with all 9700 calculators.

Three optional statistics software packages will be available for the system, HP said.

A 9825A with 8K bytes of internal read/write memory costs $5,900. Memory is expandable in optional 8K increments to a total of 32K bytes. The 9866B printer is priced at $3,350.

Deliveries are expected to begin in March from the firm at 1501 Page Mill Road, Palo Alto, Calif. 94304.

Rolm General-Purpose System Aimed at Rugged Environments

CUPERTINO, Calif. – The Model 1664 minicomputer is a rugged, general-purpose minicomputer for severe environment applications and military use, according to its vendor, Rolm Corp.

Billed as a triprocessor, the system includes a general-purpose CPU for data manipulation applications, a variable precision floating-point processor and a direct memory access processor for I/O traffic. Up to 61 I/O devices can be attached to the CPU.

The 1664 meets the military's environmental specifications, the firm said. A special conductive cooling system eliminates the need for internal fans or coolants.

Upwardly compatible from a Data General Corp. Nova, the system has over 200 instructions. Main memory is available in 16K-byte increments; up to 128K bytes of memory can be directly addressed, Rolm said.

Software for the system includes a stand-alone operating system, real-time operating system and a disk operating system that support all major peripherals, according to the firm. Languages include Fortran IV, Algol and Basic.

The price of the Rolm CPU without memory is $24,950. With 16K bytes of memory and chassis, the price is $32,000, a spoksman said from 18922 Forge Drive, Cupertino, Calif. 95014.

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Cost of Peripherals Seen Decreasing Significantly

(Continued from Page 29)

This double unit will easily replace cartridge disk units and use presently available components, the report continued.

The $5,000 printer is another replaceable item, Northeast said. Most printers are used on a "part-time" basis, printing at a much faster rate than is really required, but for only short periods of time when required by the CPU. Some users have found that putting the printer at the demand of a $40,000 tape drive is an answer to the problem.

Putting the printer off-line and at the demand of the serial access storage unit of the future recommended to replace disk cartridge would cut the costs to $3,000, the study said. Even lower cost off-line printers will be required in the future for a $20 CPU, according to Northeast.

Revision of Interfaces

Interfacing must also be revised to fit the CPU of the future, the report said. Now interface cards are used to "logically tie a foreign device to the input or output bus of the computer. The interface card does the logical start, stop, handshaking and data transfers that are required."

The cost of such interfaces range from $500 to $2,000 for each device.

The CPU predicted by Northeast would internally have multiple microprocessors working on data and interfacing.

As many as required data microprocessors would be working on internal functions, doing basically the same operations as performed by today's normal central processors.

Others would be working as interface microprocessors. In emergency conditions, data microprocessors could be interrupted to perform interface functions or vice versa.

Other features of the future system would be microprogrammed dedicated read-only memory (ROM), handling all interface requirements.

This type of assignment would be on an as-available basis, starting with the most significant microprocessors.

Northeast believes this interfacing system would outperform hard-wired interfaces for 1/3 the cost, creating a $150 interface for the $20 central processor.

Device Handles Accounting Tasks

NEW YORK – The Datasaab Systems, Inc. (DSI) D12 accounting system is designed for small- and medium-sized businesses, according to Datasaab Systems, Inc.

The microprocessor-controlled 3K system has a two-section keyboard. The numeric pad contains the program keys. Data input, program selection and supervision are operator-controlled at the keyboard, the firm said.

Typical system applications include accounts receivable, invoicing, sales analysis, general ledger, accounts payable and payroll accounting.

A basic program controls system functions and carries out instructions given by the user program.

The system can contain up to 118 individual registers, the firm said.

A basic D12 system with 22 memory registers and without programming costs $6,160. A typical system adds 96 additional memory registers and programming for $7,746, according to the firm.

The company can be reached at 437 Madison Ave., New York, N.Y. 10022.

Mini Systems Get Orbis Disk Drives

TUSTIN, Calif. – The models 76 and 77 disk drives from Orbis Systems, Inc. are available for mini OEMs.

They are offered in standard or double density with up to 6.4M bits, a 250K bit/sec transfer rate and 6-msec track-to-track access time.

The drive features a door close-and-open interlock to eliminate operator error and to prevent media damage and data corruption, the firm said.

Model 77 is designed for daisy-chain configurations, but is mechanically the same as the Model 76. Up to three 77s can be interfaced to a Model 76.

The model 76 costs $528 and the Model 77 is $445 in OEM quantities from the firm at 14251 Franklin Ave., Tustin, Calif. 92680.

Floppy Disk Controller For Minis, Micros

SUNNYVALE, Calif. – The Model 121 floppy disk controller is a multidrive memory device from Dicom Industries, Inc. for both microprocessor and minicomputer applications.

The 121 is compatible with DMA channels as well as programmed I/O channels, the firm said. The controller contains all formatter and positioning logic.

The controller costs $772 in OEM quantities from the firm at 715 Pastoria Ave., Sunnyvale, Calif. 94086.

Ampex Starts Memory Family

MARINA DEL REY, Calif. – Ampex Corp. has introduced the MCM-1000, which it said is the first in a family of OEM microcomputer core memories designed for terminal, peripheral and microprocessor applications. The MCM-1000 provides 450 nsec access to 1K, 2K or 4K eight-bit data words and full cycle operation in 1,300 nsec, according to the firm.

Each module is a self-contained memory including timing and control, data and address registers, decoding and drive circuits and TTL negative true interface. the firm said.

A data-save feature is incorporated in all versions of the MCM-1000 to prevent loss of data.

The MCM-1000 is priced under $500 in OEM quantities and "is cost-effective in applications where loss of data due to volatility will present operational problems and increased expense," the spokesman said.

Ampex is at P.O. Box 33, Marina del Rey, Calif. 90291.

Wyle Computer Designs Modular Micro

HAMPTON, Va. – A microcomputer system from Wyle Computer Products was designed with major subsystems on individual logic cards to allow flexibility in configuring memory and I/O structure, the firm said.

Called "μp," the system can be interfaced to Digital Equipment Corp.'s PDP-11; programs for the system can be developed and debugged on the DEC system, Wyle said.

The system can also function as a remote data acquisition or control device under the supervisory control of a host computer, the firm said.

The system includes the Intel 8080A CPU, up to 64K words of memory available in 1K and 4K word increments of random-access memory (RAM) and a 256-word RAM/1K-word read-only memory (ROM) module.

The CPU module costs $170; memory costs $100 for 1K RAM and $245 for the RAM/ROM module from the firm at 3200 Magruder Blvd., Hampton, Va. 23666.

Beacon Unit Has 8-Bit Processor

METUCHEN, N.J. – A microprocessor-based system from Beacon Computer Corp. here contains a CPU, 500 char./min printer, tape reader and punch, card edge reader, 64K bytes of memory cables, power supply and documentation, according to the firm.

The Model B6800 features an 8-bit parallel processor. Up to 64K words of memory can be addressed and memory can be any combination of random-access, read-only or programmable read-only memory.

Memory is expandable in 1K-, 2K-, 4K- and 8K-byte increments, the company said.

Communications and I/O interface ports are supplied for 30ma teleprinter operation, RS-232C data transmission and 16 bidirectional I/O lines, the firm said.

Software includes modified Basic, Fortran and Cobol compilers; each takes up less than 5K of memory.

The system costs $1,250 from the firm at 3 Lexington Drive, Metuchen, N.J. 08840.

Micro Products

Unibus Extender Made for LSI-11

GOLETA, Calif. – Associated Computer Consultants (ACC) has a Unibus extender for Digital Equipment Corp.'s LSI-11 microcomputer.

The UA-11A, which costs $650, makes the LSI-11 bus and Unibus into one bus with a maximum data rate of 650,000 word/sec and is packaged on a circuit board for insertion into the H9270 backplane, ACC said.

The device is available from the firm at 150 Aero Camino, Goleta, Calif. 93017.

Rockwell Unit Eases PPS-8 Programming

ANAHEIM, Calif. – Rockwell International's Assemulator was described by the vendor as an instrument that facilitates assembly, debugging and modification of programs for the firm's PPS-8 microcomputers.

With software, programming and operating manuals, the Assemulator sells for $3,450.

Rockwell International is at 3310 Miraloma Ave., Anaheim, Calif. 92803.

Book Out on Micros

NEW YORK – A collection of recent articles from *Electronics Magazine*, including analyses of specific systems, design innovations and practical applications, is included in *Microprocessors* from McGraw-Hill Book Co. here.

Laurence Altman, senior editor of *Electronics Magazine*, edited the 154-page work, which is available for $13.50 from the firm at 1221 Ave. of the Americas, New York, N.Y. 10020.

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The BTI 4000 timesharing system lets you retain overall system control and security while delegating local control to major account groups. In effect, you can "sublet" portions of the system with no sacrifice in inter-account group security. Think of it as an office building: the manager can give out a separate master key for an entire floor—delegating responsibility for a group of offices to his tenant.

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Past, Present IBM Competitors Evaluate Their Fates

RCA Series Killed Spectra

By Edith Holmes
Of the CW Staff

NEW YORK – Intending to "intercept" IBM's 370 family in the 1970 computer systems marketplace, RCA Corp.'s RCA Series knocked its own previous product line out of the business instead, a former RCA marketing executive recently told the court hearing the U.S. government's antitrust suit against IBM here.

"Intercepted?" Edwin S. McCollister added and laughed. "The RCA Series blew Spectra 70 machines out of the water."

With RCA from 1961 until 1970, McCollister served chiefly in marketing positions and was vice-president of marketing when he left the corporation to join Burroughs Corp. as director of international market development. His time at RCA spanned the introduction of both the Spectra and the RCA Series.

Prior to working for RCA, McCollister was employed at Electrodata Corp., a company acquired in 1956 by Burroughs.

McCollister reiterated the testimony of Arthur D. Beard, former chief engineer in RCA's Computer Systems Division when he described the corporation's efforts to make the Spectra line as compatible as possible with IBM's 360 machines [CW, Jan. 26]. He maintained RCA was successful in its efforts to give customers a somewhat greater capability for the same amount of money.

But by the late '60s, while RCA anticipated IBM's 370 announcement, the corporation had no idea how to design a follow-up product line to the Spectra series.

"We had caught up with Spectra; now we began to slip behind," he said, adding at that time he had little connection with the Computer Systems Division's planning functions.

Cosmetic Treatment

RCA announced a new series on Sept. 15, 1970 – the RCA Series – but this line of machines turned out to be little more than a cosmetic treatment of the Spectra models 70/45, 70/46, 70/60 and 70/61 with new model numbers and new pricing, McCollister said.

There were some minor technical improvements in the RCA Series, but fundamentally the products were not changed. The prices of these "new" machines were 15% to 20% lower than those of the Spectra series, he stated.

The announcement of the RCA Series brought more orders. However, manufacturing costs went up, additional capital was required to support the leasing of these systems and Spectra 70 equipment was displaced before it was fully depreciated, he said.

The RCA Series hastened the return by customers to Spectra systems then installed on a lease basis, the witness noted. The user could get new equipment with a more modern appearance for a lower price.

(Continued on Page 33)

NCR Cites Its Vulnerability

By Edith Holmes
Of the CW Staff

NEW YORK – Profitable for the first time in 1973, NCR Corp.'s current projections for increased net profits in the coming years won't be met "if there are changes in the industry that we can't yet foresee," an executive with the corporation recently told the court hearing the U.S. vs. IBM antitrust case here.

Such changes would include the erosion of marketplace prices and the shortening of estimated product lives, according to John J. Hangen, senior vice-president of corporate affairs for NCR.

With a current investment in rental equipment of about $300 million, NCR has assets totaling $2.1 billion. The corporation has financing for the "foreseeable future," he stated, and "hasn't fully utilized its present lines of credit."

There are actions which IBM could take that would force NCR out of the market, Hangen added. Specifically, IBM could reduce prices to such an extent that if NCR tried to follow suit, it would no longer be able to manufacture and distribute its equipment at a profit.

Hangen said he would personally favor a higher ratio between systems sold and systems leased – on the order of 50:50. The immediate return on investment through the sale of NCR equipment would allow the company to expand its efforts in the DP field and eventually, to reduce manufacturing costs by selling more systems, he said.

NCR systems, installed on a rental basis, include 90% of the Century series, 75% of the NCR 399 and 90% of the NCR 315, he said.

Projects Curtailed

On occasions, NCR has curtailed certain projects because they might have stretched the available financing beyond what would have been prudent, Hangen added.

A new generation of retail terminals was deferred in the late 1960s, for example, and the activities of NCR's Appleton Paper Division have been restricted at times.

However, plans for the Century series haven't been limited by financial concerns, he observed.

"I don't think we consciously would have restricted acceptance of business in computer systems," he said.

Hangen testified on direct examination that NCR has priced its computer systems 5% to 10% less than comparable IBM systems since 1964. He also indicated NCR likes to have its prices at least equal to those of its other competitors, including Honeywell, Burroughs and Control Data Corp.

During cross-examination directed by IBM attorney David Boies, however, Hangen indicated NCR's competitors in

(Continued on Page 33)

Five-Year Plan Still Undivulged

NEW YORK – Even though NCR Corp.'s current five-year plan was subpoenaed by IBM counsel for use in the U.S. government's antitrust suit against the industry leader, the substance of the plan hasn't been divulged in court, according to John J. Hangen, NCR's senior vice-president in charge of corporate affairs.

"The attorneys haven't really used the five-year plan for 1975-1979," Hangen noted. "The plan projects increased profits for NCR," but that goal has been and will continue to be stated publicly: "The company's objectives for growth are in the range of 10% to 15% annually."

NCR anticipates a slightly higher growth rate for computer system revenues, he added. The plan also indicates the corporation expects over half of its 1969 computer systems revenues to come from new customers.

Fearing IBM would use the five-year plan to the detriment of NCR, Hangen had refused to turn over the document when IBM first requested it last year [CW, Nov. 19].

Problems of the plan's confidentiality had been resolved when Hangen resumed the stand in mid-January following a three-month break in his testimony.

Excerpts of the plan have been entered into evidence, and Judge David N. Edelstein can consult with NCR's attorneys should he need to review the entire plan.

An increased customer base and lower market costs as a percentage of revenues will lead to an improvement in total profitability, according to the five-year plan.

Hangen also said NCR does not expect a change in gross profit margins for its computer systems operation through 1979. Profit percentages will improve, however, because "projected increases in customer installations will result in a reduced percentage of costs for marketing and support of the customer base."

Finally, Hangen stated, growth is expected primarily in large-scale and small-scale computers rather than in the previously popular medium-scale range.

CI Notes

FTC Investigating IBM Role In Office Typewriter Mart

WASHINGTON, D.C. – The Federal Trade Commission (FTC) will conduct an investigation to determine whether IBM monopolizes, has attempted to monopolize or has engaged in unfair methods of competition in the office typewriter market.

IBM Chairman Frank T. Cary said IBM will cooperate as the investigation proceeds.

The record, when completed, will show IBM has competed fairly and has not in any way violated the law, Cary said.

Calcomp Up First Against IBM

SAN FRANCISCO – Who's up first? California Computer Products Corp. (Calcomp) will lead off the batting order against IBM in its antitrust case set for trial Nov. 8.

The date for Memorex' trial remains March 1977.

Calcomp moved to the top of the batting order among the several California firms whose antitrust cases against IBM have been consolidated for the pretrial phase under Judge Ray McNichols, displacing Hudson General and Transamerica.

The date for these cases is undecided, and they may be merged into the Memorex case, sources said.

The change in lineup occurred when Transamerica's counsel asked for a continuance of the case, which caused both cases to be dropped to the end of the line.

Intel, CIG Settle Suit

SANTA CLARA, Calif. – Intel Corp. and Computer Investors Group (CIG) have settled a $1.4 million breach of contract suit filed by Intel.

As part of the settlement, CIG dropped its $9.4 million counterclaim against Intel.

The financial terms of the out-of-court settlement were not disclosed. Intel agreed to support the add-on memories at CIG computer sites.

FCC Wants to Decide Gray Areas In U.S. vs. AT&T Antitrust Trial

By Molly Upton
Of the CW Staff

WASHINGTON, D.C. – The court hearing the U.S. vs. AT&T antitrust case should refer any unsettled questions to the Federal Communications Commission (FCC), the agency said in a friend of the court brief.

Citing the doctrine of primary jurisdiction, the FCC said it should have first review of any issues which seem to be under the concurrent jurisdiction of a court and a regulatory agency.

The doctrine of primary jurisdiction provides for the FCC to "determine the reasonableness and validity of the challenged practice under the regulatory scheme before the court determines the reasonableness and validity of the practice under the antitrust laws," according to an opinion cited by the brief.

In its filing with the District Court for the District of Columbia, the FCC said it cannot resolve a fundamental dispute between the parties as to the nature of the case, since "AT&T characterizes it as purely a 'structure' case over which the court has no jurisdiction. The [Justice Department] sees it as involving both structure and conduct resulting from and aggravating the monopoly structure of AT&T."

In a footnote, the FCC said it "does not perceive a bureaucratic power struggle. The [Justice Department] should be seen as attempting to carry out its responsibilities under the antitrust laws, just as the commission is trying to perform its duties under the Communications Act."

The brief concentrated on the issue of "whether this action is barred in whole or in part by the Communications Act and other federal and state regulatory statutes and by the regulation exercised over activities of defendants by state and federal regulatory agencies pursuant thereto."

The FCC filed the brief in answer to the question whether its jurisdiction over telephone companies under the Communications Act has preempted the court's jurisdiction under the antitrust laws to decide the case.

The Justice Department, in its opening memorandum, alleged several types of activities by AT&T were designed to prevent or impede competition. However, the FCC brief observed in a footnote, "in most cases the competition arose as a result of commission policy decisions authorizing someone other than the telephone companies to provide services and facilities that the telephone companies regarded as within their exclusive domain."

Differences Between Credos

Fundamental differences between the credos of the FCC and the Justice Department exist, according to the brief.

The FCC's charter under the Communications Act is to base its findings on the

(Continued on Page 34)

NCR Cites Vulnerability in Competitive DP Market

(Continued from Page 32)

computer systems go beyond Honeywell, Burroughs, CDC, IBM and Sperry Rand and added Data General, Decision Data, Digital Equipment Corp., Four Phase General Computer Systems, Hewlett-Packard, Management Assistance/Basic Four, Nixdorf and Singer to the list.

Hangen also said NCR competed with General Electric, RCA and Xerox in systems when those companies were in the business.

NCR does not consider leasing companies as competititon in pricing its systems and only looks at peripheral companies when their products might be incorporated into NCR's competitors' systems, the NCR vice-president stated.

Close Attention to Discounts

Educational discounts and bundled prices were and are market practices in which NCR paid close attention to IBM's actions, Hangen said.

In deciding whether to offer an educational institution some form of discount, NCR's pricing committee still heeds the discounts offered by others – "especially those provided by IBM."

Similarly, like most companies in the systems business, NCR waited until 1969 to unbundle, despite the fact that "the cost of a bundled effort was a serious burden on the corporation," Hangen said.

Based on International Data Corp. and Quantum Sciences studies, the value of NCR installed systems is 2% to 3% of the total systems market, he said.

Hangen said NCR provides its overseas subsidiaries with lists of U.S. prices. These companies then consider landing or importing costs and their own local market conditions in order to establish a final price.

Subsidiary managers generally seem to feel IBM is not as great a factor in Europe as it is in the U.S.; according to Hangen.

In addition to efforts to break down the government's notion of a "systems" market consisting of some seven or eight competitors, the defense also sought to show the lack of distinction within the industry between the terms "CPU," "terminal" and "peripheral."

Define Terms

"When is a terminal a peripheral and when is it a processor?" IBM counsel asked. In particular, these questions centered on the NCR 299, an intelligent terminal, and the NCR 725 and 726, special or communications controllers.

Hangen stated that because the 725 and 726 do contain NCR 605 minicomputers which serve as memory units for these devices, they may be classified technically as computers by NCR's accountants.

He added, however, that he would not consider these machines linked to NCR 280 terminals to constitute a computer system.

RCA Series Death of Spectra

(Continued from Page 32)

RCA, meanwhile, was faced with an increased cash drain on the corporation as a whole, a buildup in computer system inventory and a continued depreciation on equipment no longer in a position to pull in income to offset this expense, McCollister said.

McCollister described the entire episode in RCA's history as "a significant financial event," but he could not recall the specific figures associated with the introduction of the RCA Series and the consequent end to Spectra 70 systems.

Things Turned Sour

Looking back to the time preceding this era, McCollister testified things started turning sour for RCA and its Spectra series in 1968 when the company experienced very little growth in new orders.

Prior to that year, RCA's computer business revenues had grown at about 30% annually, he noted, and the company had projected a similar growth rate for 1968.

He suggested RCA's failure to meet its projected goals was the result of an overly ambitious sales forecast and a sales force tied up in installing equipment it had sold or leased in 1966 and 1967.

RCA's Computer Systems Division met the objectives set for it by the corporation for each year – except in 1968, McCollister said, when the new orders quota was not met.

Profit Problems

While revenues improved between 1966 and 1969, profitability did not. He remembered in 1969 the division did reach the break-even point as it had in 1964 and 1965.

On direct examination, the former RCA executive said the number of systems manufacturers has declined in the last six or seven years while there has been a proliferation of companies making parts of total computer systems.

The rate of technological change has increased for all, he told the court, adding semiconductor advances have particularly affected the mainframers.

Competing With IBM

IBM is more difficult to compete with because of its size and presence in the marketplace, the capability of its marketing force and its large customer base, McCollister testified.

IBM also had extensive contact within the various user industries, including banking and medicine, he stated. It was difficult for RCA to match IBM in providing training in such a wide range of applications industries.

"Wherever we went, we were in a competitive situation," he said of RCA, adding IBM's organization was about 20 times larger than RCA's.

Systems Market

McCollister described the systems marketplace while he was at RCA from 1961 to 1970 as a competitive climate with five, six or seven other manufacturers who were interested and competent in the computer business.

During this time period, those in the industry saw the introduction of new products, growth of the business as a whole, unprofitability for several manufacturers, a shortage of qualified people and a small margin for error – both technically and financially, he said.

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"We believe the breakthrough has come. We're using fourth generation technology right now."

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Visiting San Francisco during the week of February 22?
Visit our Sunnyvale headquarters and tour the facilities. Courtesy transportation from the San Francisco Downtown Airline Terminal (adjacent to the San Francisco Hilton Hotel) on Wednesday February 25, and Thursday, February 26. Schedule for both evenings: leave San Francisco at 7:00 p.m, arrive Amdahl at 7:45; leave Amdahl at 9:00 pm, arrive San Francisco at 9:45. Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086, (408) 735-4011, TWX 910-339-9293.

FCC Wants Role In U.S. vs. Bell

(Continued from Page 32)

public interest, convenience and necessity. But the antitrust laws look solely to competition as the safeguard of the public interest, the brief observed.

"Although competition is a relevant factor in determining where the public interest lies . . . the commission's mandate is not to further competition or to balance the equities among competitors, but to determine how best to provide service to the public," the FCC stated.

"In some cases, the differing standards could result in inconsistent or even contradictory directions to a member of a regulated industry," the brief continued.

The varying requirements of the regulatory and antitrust regimes can best be resolved by applying the doctrine of primary jurisdiction, the FCC said.

The FCC regards all of the specific allegations of conduct listed by the Justice Department in its opening memorandum as within its own regulatory jurisdiction, but this does not mean the court has no jurisdiction, the brief continued.

The areas of FCC authority exclude the courts from requiring entry into the communications market, frustrating FCC orders to interconnect telephone systems and basing antitrust relief upon tariff provisions that have been approved or prescribed by the comission, the filing indicated.

Other unsettled matters that are within or directly affect the FCC's regulatory policies should be referred by the court to the FCC under the doctrine of primary jurisdiction, the FCC said.

"Where the commission has settled such questions, the court should take judicial notice of the Commission's decisions," the FCC said.

"We urge the court to take no action that will substantially alter the industry structure without initial consideration by the FCC of how such action will comport with the 'public interest' as perceived by the commission in the light of its mandate under the Communications Act."

Caravan Adds Exhibit Hours For Congressional Viewing

WASHINGTON, D.C. – The Computer Caravan will feature a special 2-1/2-hour extension of exhibit hours for members of Congress and their staffs on March 17 here.

The Congressmen will be exploring the various products and services now available to them under their $1,000/mo per member allowance for DP services.

This translates into a $5.2 million market for service and equipment vendors.

As an example of Congress' renewed emphasis on computers, the Committee on House Administration discontinued the "approved" list of terminals Jan. 1.

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Honeywell '75 Results Better

MINNEAPOLIS – Thanks to a change in accounting methods, Honeywell, Inc. reported improved fourth-quarter and full-year earnings.

Honeywell's 1975 earnings would have been 10% lower than 1974's without the accounting change, President Edson W. Spencer said.

For the year, the firm earned $77.8 million or $3.96 a share, including $1.3 million special credit, compared with a restated $67.1 million or $3.48 a share in 1974.

Revenues rose to $2.7 billion from $2.6 billion.

The accounting change increased 1975 earnings by $8.4 million or 43 cents a share and reduced 1974 earnings by $8.6 million or 45 cents a share, Spencer said.

During the year, DP rental and service revenues rose 12% to $771.1 million, and outright sales revenue was "slightly ahead" of that in 1974, Spencer said.

During the quarter, earnings rose to $33.3 million or $1.68 a share, including a special credit of $423,000, compared with a restated $21.7 million or $1.11 a share, including a special credit of $3.5 million.

Revenue rose to $810.8 million compared with $753.6 million.

Spencer said he expects "most, but fairly steady, improvement" in orders for computer systems in 1976.

Quarter Net Drops 51%

NCR Earnings Down 17% in '75

DAYTON, Ohio – A 51% drop in NCR's fourth-quarter earnings helped drag down the firm's 1975 earnings by 17% compared with the year-ago figures.

Revenues rose 4% for the quarter and 9% for the year, exceeding $2 billion for the first time.

Incoming orders matched those of the previous year, with gains achieved abroad offsetting a decline domestically, president William S. Anderson said. "However, except for computer systems, bookings did not reach our 1975 objectives."

Fourth-quarter earnings dropped to $17.3 million or 68 cents a share compared with $35.3 million or $1.40 a share in the same period last year. Revenues for the quarter reached a record $648.6 million compared with $626.4 million in the year-ago period.

The decline in earnings resulted in part from costs associated with the completion of the phaseout of all mechanical-product manufacturing in the U.S., which was sooner than expected, the firm said.

NCR also incurred heavy termination liabilities because of employment reductions overseas and the closing of two small European factories.

For the year, the firm earned $72.5 million or $2.90 a share compared with a record $87.2 million or $3.53 a share last year.

Revenues reached $2.17 billion compared with just under $2 billion last year.

Other factors affecting fourth-quarter results as well as those for the year included reductions in manufacturing schedules implemented early in 1975 to reduce inventories, according to Anderson.

The firm also spent more in research and development, $85 million compared with $74 million in 1974, he said.

The transition from mechancial to electronics manufacturing has now been completed in the U.S. and is 90% complete overseas, Anderson said.

The company's 1975 inventories-reduction program achieved marked success, Anderson added. Inventories declined by $134 million in 1975.

In commenting on the outlook for 1976, he noted it is unlikely first-quarter earnings will equal those of the same 1975 period since these have been restated upward by $6.5 million.

"However, assuming continuation of the domestic recovery and reasonably good business conditions abroad, the outlook is favorable for improvements in both revenues and earnings for 1976 as a whole," he concluded.

Memorex Reports Profitable 12 Months

SANTA CLARA, Calif. – Memorex Corp. scored its first profitable year since 1969, with earnings of $18 million or $3.77 a share. This included $9.8 million in special credits from the purchase of debentures and tax credits.

This compared with a loss of nearly $9 million or $2.08 a share in 1974.

Revenues, aided by the increased sale of equipment, rose 21% to nearly $264 million compared with $217.6 million last year. Equipment lease revenues were about the same as last year, the firm said.

During the fourth quarter, earnings totaled $5.9 million or $1.21 a share, including $2.6 million in special credits, compared with a loss of $2.5 million or 59 cents a share in the same period last year.

Revenues for the three months rose 17% to $69.8 million compared with $59.6 million in the same 1974 period.

At year end, the company had reestablished positive net worth which totaled $3.1 million.

During 1975, depreciation was charged against nearly all lease base equipment. Some product lines will become fully depreciated this year, largely during the first quarter, the firm said.

Depreciation charges on these products were $12.9 million in 1975 and their year-end book value was $4.6 million.

To the extent that demand for these products continues through 1976, reported results will benefit from the reduced depreciation, the firm said.

The firm increased cash balances at year end to $40.2 million from $28.4 million.

Memorex' indebtedness to senior lenders was reduced from $163.1 million to $117.6 million.

DP Analysis Shows Common Stock On Rebound After Two Bad Years

WALTHAM, Mass. – After two years of decline, common-stock values rebounded in 1975 with average price gains of 38.7% on the New York Stock Exchange (NYSE) and 44% on the American Stock Exchange (Amex), according to a computer analysis performed by Interactive Data Corp. here.

Despite a weakening market during the last half of the year, total market value of stocks on both exchanges was up more than $171 billion. In 1974, stock values dropped $230 billion.

Advances for the year were shown by 88% of issues on the NYSE and 83.9% of those on the Amex.

Among major stock indexes, the Dow Jones showed a 38.32% rise for 1975 to 852.41, and the NYSE Composite climbed 31.86% to 47.64. Standard & Poor's 500 average was up 31.55% to 90.19, while Amex Market Value added 38.40%, and the Value Line Composite rose 44.35%.

In the last three months of 1975, stocks on the Big Board recorded an average gain of 5.4%, with 62.1% of issues advancing, and 33.3% declining.

On the Amex, there was no measurable change in the value of an average share during the fourth quarter. While 37.5% of issues made gains, 54% showed losses, the analysis showed.

During the period, the Dow Jones rose 7.37%, the NYSE Composite 7.08% and Standard & Poor's 500 gained 7.54%. Amex Market Value was up a slight 0.41% and the Value Line Composite was ahead by 4.43%.

"The indexes show that, while the issues of lesser investment grade led a broad advance in the first half, the fourth quarter continued a trend in which their performance was sharply lower than that of the blue chips," Jack A. Arnow, president of Interactive Data, said.

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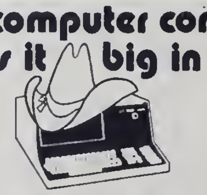

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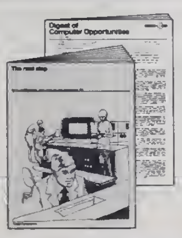

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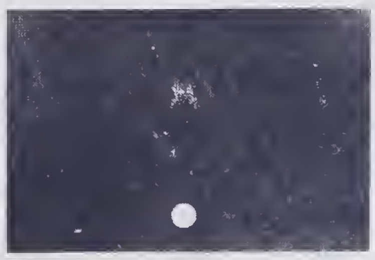

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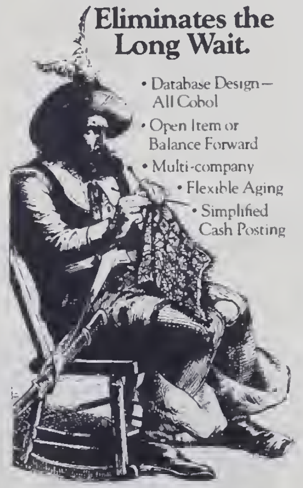

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With so many systems and so many suppliers, it's difficult to match user needs to proper products, and this new advertising section can perform a useful function in this matching process.

As a user of computer services, we hope you'll check the ads in this section each week to see if there is a turnkey system that can help solve one of your processing problems. And as a marketer of Turnkey Systems, we invite you to run a regular ad for your product in this space. The cost is quite reasonable, and a regular small-space ad can be very cost-effective.

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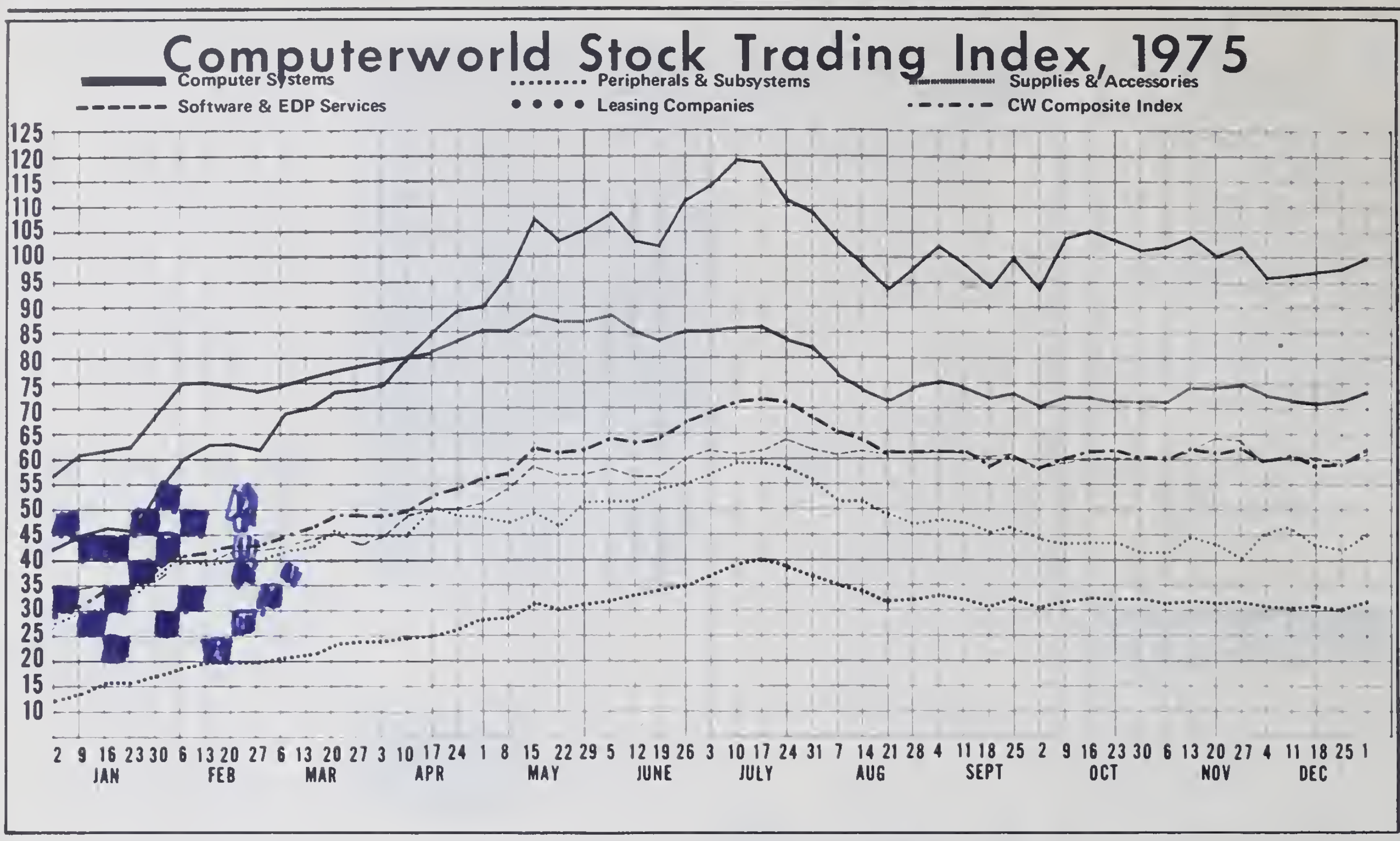

80

Performance of DP Stocks Hearty in 1975

88

By Molly Upton
Of the CW Staff

NEWTON, Mass. – Sure enough. Just when some editors at *Computerworld* had decided to shrink the upper limit of the stock-trading indexes chart to a seemingly unreachable 100 because stocks had not passed this barrier in years, the stocks started to climb.

And, as hearty as the 1975 performance appears to be, the real significance may lie in the base it's providing by even higher prices at the beginning of 1976.

CW's composite index finished the year at 60 – twice as high as it started. The last time this index broke 65 for any one quarter, as it did this summer, was at the beginning of 1973.

All categories more than doubled during the year, but only a few sustained that increase through to the end of the year.

Peripherals and subsystems turned in one of the more solid, if not most spectacular, performances of the year, rising from 13 to 40 at the end.

Systems, on the other hand, although glittering briefly in July at the 115 mark, failed to double its starting slot of 55 when it finished the year at 100.

Repressive Influence?

Xerox Corp.'s decision in late July to exit from the systems business may have served as a repressive influence on the performance of systems stocks, but the general slide could also have been part of a technical market correction.

CW's computer systems index had been slightly below that of the supplies and accessories (S&A) index since early June 1974 and was within 5 points of the S&A index for the previous six months.

In April 1975, the break was clearly made, with hardware going off to break new heights in a manner somewhat reminiscent of 1971.

The range between the highest and lowest indexes was greater than in 1974. For instance, at year-end 1975, systems was at 100 while peripherals was 30, a span of 70.

At year-end 1974, the leading index, S&A, was at 55 and the laggard, peripherals, was at 15, for a 40-point range.

Other stock news on Page 35.

Among the high flyers, one would have to include Digital Equipment Corp. and Data General Corp. (DG). DEC spanned the range from 46 to 143 while DG's range quadrupled from 10 to 43.

Computer Automation, Inc. jumped from 2 to 11, and General Automation, Inc. fluctuated between 4 and 14, to give some idea of the activity in mini firms' stocks.

Inclusion of DEC On SP Index Gave Stocks a Boost

NEW YORK – One of the reasons Digital Equipment Corp.'s (DEC) stock has been climbing is its inclusion on the Standard & Poor's (SP) Index in October, according to Harry Edelson, senior anlayst for Drexel Burnham & Co.

The addition of DEC to the index could also be giving other DP stocks a boost, he said, since many portfolio managers arrange their holdings in proportion to the percentage of the DP industry represented on the SP index.

The indexed funds managers – whose holdings are of the same stocks as the SP index – were thus required to buy DEC stock, he said.

Adding DEC increased the office-products sector by about .5% to 8.41% of the SP 500 and to about 9.21% of SP in the 425 industrials index at year end, he said.

Were Sperry Rand and Honeywell, Inc. added to the office-products category, this would also raise the percentage of DP stocks listed, Edelson said. However, SP lists these stocks in other categories, he said.

Those companies comprising the SP office-products category include: Addressograph-Multigraph, Burroughs Corp., Control Data Corp., DEC, IBM, NCR, Pitney-Bowes and Xerox Corp., Edelson said.

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Earnings Reports

GENERAL AUTOMATION
Three Months Ended Nov. 1

	1975	1974
Shr Ernd	.....	$.07
Revenue	$14,993,000	14,193,000
Earnings	7,000	177,000

IDENTICON
Three Months Ended Sept. 30

	1975	a1974
Revenue	$337,428	$136,914
Loss	27,734	184,872
6 Mo Rev	605,598	223,642
Loss	129,254	378,275

a-Restated for accounting change.

WYLY
Three Months Ended Sept. 30

	1975	a1974
Shr Ernd	.....	$.77
Revenue	$15,795,000	19,821,000
Disc Op	(31,308,000)	b(9,590,000)
Loss	35,885,000	3,180,000
9 Mo Shr	.....	.13
Revenue	46,799,000	59,727,000
Disc Op	d(34,418,000)	b(6,673,000)
Loss	47,927,000	5,581,000

a-Restated to reflect sale of computer leasing operations, energy division and insurance operations expected to be sold. b-Includes $323,000 gain in quarter and $1.32 million gain in nine months from energy operations. d-Includes $2.85 million gain from energy operations.

AMPEX
Three Months Ended Nov. 1

	1975	a1974
Shr Ernd	$.33	$.14
Revenue	66,035,000	60,088,000
Disc Op	.....	(545,000)
Tax Cred	1,521,000	656,000
Earnings	3,600,000	1,572,000
6 Mo Shr	.47	1.35
Revenue	129,690,000	121,363,000
Disc Op	.....	(560,000)
Tax Cred	2,128,000	6,166,000
Earnings	5,159,000	b14,697,000

a-Restated to reflect discontinued operations. b-Includes $13 million pretax income from settlement with IBM.

COGNITRONICS
Three Months Ended Sept. 30

	1975	1974
Shr Ernd	.....	$.09
Revenue	$802,414	1,297,132
Tax Cred	.....	63,000
Earnings	(186,897)	129,998
9 Mo Shr	.....	.24
Revenue	2,876,956	3,573,658
Tax Cred	.....	173,000
Earnings	(231,113)	359,871

DATATAB
Three Months Ended Sept. 30

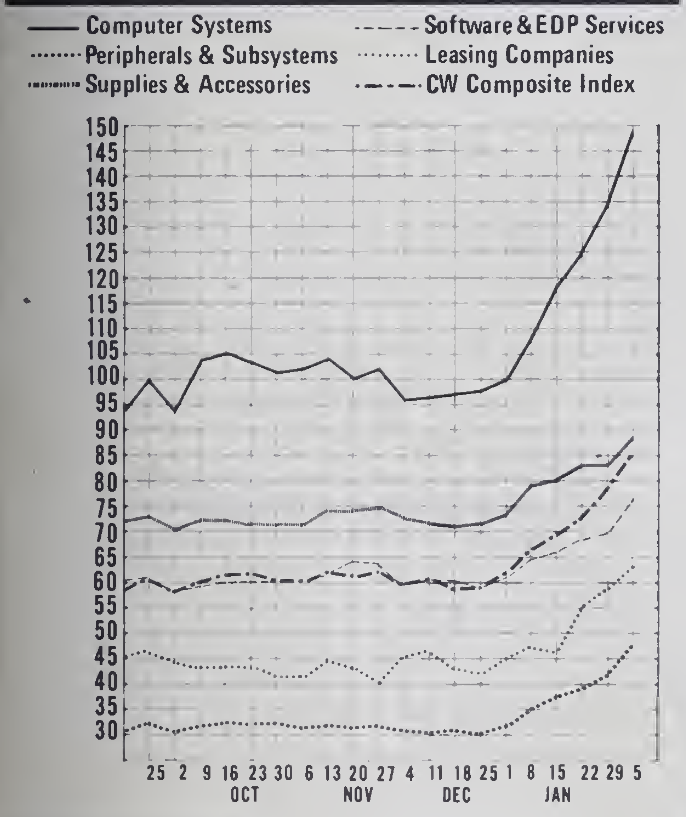
	1975	1974
Shr Ernd	.....	$.01
Revenue	$1,103,856	1,304,947
Tax Cred	203,116	.....
Earnings	(203,116)	4,565
9 Mo Shr	.....	$.11
Revenue	$3,340,121	3,812,341
Tax Cred	215,000	.....
Earnings	(268,773)	87,140

NATIONAL DATA COMMUNICATIONS
Three Months Ended July 31

	1975	1974
Shr Ernd	$.09	.....
Revenue	838,998	$503,342
Disc Op	.....	a(367)
Tax Cred	68,678	368
Earnings	150,411	(51,883)
9 Mo Shr	.11	.62
Revenue	2,138,791	1,143,274
Disc Op	.....	a1,145,276
Tax Cred	77,843	457,461
Earnings	181,268	1,143,801

a-Includes gains of $857 in the quarter and $1.07 million in the nine months from disposition of discontinued operations.

COMPUTERWORLD Computer Stocks Trading Indexes



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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, FEBRUARY 4, 1976

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1975-76 RANGE (1)	CLOSE FEB 4 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	62-109	106 5/8	+4 5/8	+4.5
O	COMPUTER AUTOMATION	2- 17	16 3/8	+1 3/4	+11.9
N	CONTROL DATA CORP	11- 26	26 1/8	+2 5/8	+11.1
N	DATA GENERAL CORP	10- 49	48 1/4	+3	+6.6
O	DATAPOINT CORP	6- 32	32	+4 1/2	+16.3
O	DIGITAL COMP CONTROL	1- 4	2 3/4	- 1/4	-8.3
N	DIGITAL EQUIPMENT	46-166	163 7/8	+7 5/8	+4.8
N	ELECTRONIC ASSOC.	2- [illegible]	4 1/4	+1	+30.7
A	ELECTRONIC ENGINEER.	5- 10	10	+1 1/4	+14.2
N	FOXBORO	23- 42	38	+4 7/8	+14.7
O	GENERAL AUTOMATION	4- 14	9 5/8	+1 5/8	+20.3
O	GRI COMPUTER CORP	1- 1	3/4	+ 1/8	+20.0
N	HEWLETT-PACKARD CO	58-120	115 5/8	+7 1/4	+6.6
N	HONEYWELL INC	22- 54	52 7/8	+5 1/8	+10.7
N	IBM	158-264	263 3/4	+12 3/4	+5.0
O	MANAGEMENT ASSIST	1- 1	1 3/8	+ 1/8	+10.0
O	MEMOREX	1- 15	15 1/4	+ 1/8	+0.8
O	MICRODATA CORP	2- 19	18 5/8	+3 7/8	+26.2
O	MODULAR COMPUTER SYS	5- 14	13	+1	+8.3
N	NCR	15- 39	30 5/8	+2 7/8	+10.3
O	PRIME COMPUTER INC	2- 7	5 3/4	- 1/2	-8.0
N	PERKIN-ELMER	16- 30	26 1/2	+ 7/8	+3.4
N	RAYTHEON CO	26- 50	51 1/2	+3	+6.1
N	SPERRY RAND	26- 49	46 1/2	+3 1/4	+7.5
O	SYCOR INC	5- 25	25	+3	+13.6
A	SYSTEMS ENG. LABS	1- 9	8 1/8	+ 1/2	+6.5
N	VARIAN ASSOCIATES	7- 18	16 3/8	+1 5/8	+11.0
N	WANG LABS.	7- 17	16 3/4	+2 3/8	+16.5

LEASING COMPANIES

EXCH		PRICE 1975-76 RANGE (1)	CLOSE FEB 4 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMDISCO INC	1- 7	7 1/8	+1 3/4	+32.5
A	COMMERCE GROUP CORP	2- 4	2 3/4	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	1 1/4	- 1/8	-9.0
M	DATRONIC RENTAL	1- 1	3/8	0	0.0
A	DCL INC	0- 1	1/2	0	0.0
N	DPF INC	3- 7	6 5/8	+ 3/8	+6.0
O	EDP RESOURCES	1- 2	1	+ 1/4	+33.3
A	GRANITE MGT	1- 5	4 1/2	0	0.0
A	GREYHOUND COMPUTER	2- 4	4 1/4	+1 1/4	+41.6
N	ITEL	3- 9	8 3/8	+ 1/2	+6.3
N	LEASCO CORP	4- 9	9 1/4	+ 5/8	+7.2
O	LEASPAC CORP	1- 1	1/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	NRG INC	0- 4	1/4	- 1/8	-33.3
A	PIONEER TEX CORP	2- 7	7 3/8	+ 3/4	+11.3
A	ROCKWOOD COMPUTER	1- 1	1/8	0	0.0
N	U.S. LEASING	7- 14	10 3/4	+1 1/8	+11.6

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
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SOFTWARE & EDP SERVICES

EXCH		PRICE 1975-76 RANGE (1)	CLOSE FEB 4 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 1	1	0	0.0
A	APPLIED DATA RES.	1- 10	2 1/2	+ 1/8	+5.2
N	AUTOMATIC DATA PROC	29- 65	64 3/4	+2 3/4	+4.4
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
O	COLEMAN AMERICAN COS	4- 6	5	+ 1/8	+2.5
O	COMPUTER DIMENSIONS	2- 6	4 5/8	+ 3/4	+19.3
O	COMP ELECTION SYSTMS	3- 7	5 3/4	+ 1/4	+4.5
O	COMPUTER HORIZONS	1- 1	1/2	0	0.0
O	COMPUTER NETWORK	1- 3	2 5/8	+ 3/8	+16.6
N	COMPUTER SCIENCES	2- 6	5 3/8	+ 1/8	+2.3
O	COMPUTER TASK GROUP	1- 1	7/8	0	0.0
O	COMPUTER USAGE	2- 4	2 3/4	- 1/8	-4.3
O	COMSHARE	2- 4	3 1/8	+ 3/4	+31.5
O	COMTEN INC	1- 6	5 1/2	+1 1/8	+25.7
O	DATATAB	1- 2	1	0	0.0
A	ELECT COMP PROG	1- 1	1/8	0	0.0
N	ELECTRONIC DATA SYS.	11- 28	15 1/2	+2 1/8	+15.8
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 1	3/4	0	0.0
O	KEANE ASSOCIATES	2- 3	2 3/4	+ 1/2	+22.2
O	KEYDATA CORP	2- 4	3 1/4	+ 1/4	+8.3
O	LOGICON	3- 5	4 1/4	0	0.0
A	MANAGEMENT DATA	1- 3	2	+ 1/4	+14.2
A	NATIONAL CSS INC	6- 19	18 1/2	+3	+19.3
O	NATIONAL COMPUTER CO	1- 1	1/8	0	0.0
A	ON LINE SYSTEMS INC	8- 17	19 1/8	+3 3/8	+21.4
N	PLANNING RESEARCH	2- 5	4	+ 1/4	+6.6
O	PROGRAMMING & SYS	1- 1	5/8	+ 1/8	+25.0
O	RAPIDATA INC	2- 5	4 1/4	+ 3/8	+9.6
O	REYNOLDS & REYNOLD	10- 24	17 1/2	+2 1/4	+14.7
O	SCIENTIFIC COMPUTERS	1- 1	3/4	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1 1/8	0	0.0
O	TYMSHARE INC	7- 27	25 5/8	+1 5/8	+6.7
A	URS SYSTEMS	2- 4	3 3/8	+ 1/4	+8.0
N	WYLY CORP	2- 5	4 1/4	0	0.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1975-76 RANGE (1)	CLOSE FEB 4 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	4- 12	12 1/8	+2 1/4	+22.7
O	ADVANCED MEMORY SYS	1- 8	9 3/8	+1	+13.5
N	AMPEX CORP	3- 7	6 5/8	+ 7/8	+15.2
O	ANDERSON JACOBSON	1- 3	2 3/4	+ 1/4	+10.0
O	BEEHIVE MEDICAL ELEC	1- 5	3 5/8	+ 1/8	+3.5
A	BOLT,BERANEK & NEW	5- 13	6 7/8	0	0.0
N	BUNKER-RAMO	4- 8	5 3/8	+ 1/4	+4.8
A	CALCOMP	3- 7	5 7/8	+1 1/2	+34.2
O	CAMBRIDGE MEMORIES	1- 5	2 1/2	- 1/8	-4.7
N	CENTRONICS DATA COMP	7- 30	30 1/8	+1 1/2	+5.2
O	CODEX CORP	15- 38	28	+5	+21.7
O	COGNITRONICS	1- 2	7/8	0	0.0
O	COMPUTER COMMUN.	1- 2	2 1/8	+ 1/2	+30.7
O	COMPUTER CONSOLES	3- 7	5 1/4	+1	+23.5
A	COMPUTER EQUIPMENT	1- 2	1 7/8	+ 3/8	+25.0
O	COMPUTER MACHINERY	1- 2	2 1/8	+ 1/2	+30.7
O	COMPUTER TRANSCEIVER	1- 2	1	0	0.0
O	COMTEN	2- 6	5 1/2	+1 1/8	+25.7
N	CONRAC CORP	12- 30	22 1/8	+ 1/2	+2.3
O	DATA ACCESS SYSTEMS	1- 3	2 1/4	0	0.0
O	DATA 100	5- 15	8 3/4	+1 5/8	+22.8
A	DATA PRODUCTS CORP	2- 8	7 1/4	+ 1/4	+3.5
O	DATA TECHNOLOGY	1- 3	1 7/8	0	0.0
O	DATUM INC	1- 2	1 1/8	0	0.0
O	DECISION DATA COMPUT	2- 7	3 1/4	0	0.0
O	DELTA DATA SYSTEMS	1- 1	1/4	0	0.0
O	DI/AN CONTROLS	1- 1	1/2	0	0.0
N	ELECTRONIC M & M	1- 3	1 3/4	0	0.0
O	FABRI-TEK	1- 1	7/8	+ 1/8	+16.6
O	GENERAL COMPUTER SYS	1- 2	2	+ 1/2	+33.3
N	HAZELTINE CORP	3- 9	8 7/8	+ 3/4	+9.2
N	HARRIS CORP	18- 41	40 3/4	+1 1/2	+3.8
A	INCOTERM CORP	3- 13	13 3/8	+2 1/4	+20.2
O	INFOREX INC	2- 5	4 1/4	+1 3/8	+47.8
O	INFORMATION INTL INC	8- 16	16	+5 1/2	+52.3
O	INTEL CORP	21- 94	92 1/2	+10 1/2	+12.8
A	LUNDY ELECTRONICS	3- 7	6 7/8	+ 1/4	+3.7
O	MSI DATA CORP	3- 10	4 7/8	+ 3/8	+8.3
A	MILGO ELECTRONICS	8- 24	16 5/8	-1 3/4	-9.5
N	MOHAWK DATA SCI	1- 5	4 1/2	+ 3/4	+20.0
O	OPTICAL SCANNING	1- 3	1 3/8	- 1/8	-8.3
O	PENRIL CORP	1- 2	1 3/4	+ 1/4	+16.6
A	PERTEC CORP	2- 8	7 1/8	+1 3/8	+23.9
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	1- 1	1	+ 1/4	+33.3
O	QUANTOR CORP	2- 6	5 1/8	+ 1/2	+10.8
O	RECOGNITION EQUIP	2- 9	7 1/8	+ 3/8	+5.5
N	SANDERS ASSOCIATES	3- 11	8 7/8	+1 3/4	+24.5
O	SCAN DATA	1- 3	2 3/8	- 1/4	-9.5
O	STORAGE TECHNOLOGY	6- 17	9 5/8	+ 1/8	+1.3
O	T BAR INC	3- 6	6 3/8	+ 1/4	+4.0
O	TALLY CORP.	1- 5	4 1/4	+ 3/4	+21.4
O	TEC INC	1- 4	3 1/4	0	0.0
N	TEKTRONIX INC	18- 59	58 1/2	+7 1/4	+14.1
N	TELEX	1- 3	3 1/4	+ 7/8	+35.8
O	WANGCO INC	4- 15	15	+ 1/4	+1.6
O	WILTEK INC	1- 4	2	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1975-76 RANGE (1)	CLOSE FEB 4 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED SYSTEMS INC	1- 3	1 3/8	+ 1/8	+10.0
O	BALTIMORE BUS FORMS	4- 5	4 1/2	+ 1/4	+5.9
A	BARRY WRIGHT	5- 9	7 7/8	+1 1/4	+13.8
O	CYBERMATICS INC	0- 1	3/8	0	0.0
A	DATA DOCUMENTS	29- 42	41 3/8	+1 1/2	+3.7
O	DUPLEX PRODUCTS INC	12- 25	21	+ 3/8	+1.8
N	ENNIS BUS. FORMS	5- 7	7	+ 1/2	+7.6
O	GRAHAM MAGNETICS	5- 10	9	0	0.0
O	GRAPHIC CONTROLS	8- 21	15 3/4	+ 1/2	+3.2
N	3M COMPANY	43- 68	62	+2 1/2	+4.2
O	MOORE CORP LTD	39- 51	49 1/4	+1	+2.0
N	NASHUA CORP	9- 22	12 7/8	+1 1/4	+10.7
O	STANDARD REGISTER	11- 20	17 1/4	0	0.0
O	TAB PRODUCTS CO	4- 8	7	+1	+15.6
N	UARCO	17- 24	22 3/8	+1 1/4	+5.9
O	VANIER GRAPHICS CORP	4- 7	5	0	0.0
A	WABASH MAGNETICS	3- 6	5 1/2	+ 3/8	+7.3
N	WALLACE BUS FORMS	15- 25	22 5/8	+1 3/8	+6.4

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